NEVARC NEWS VK3ANE

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Next Meeting Details will be emailed to members

Latest meeting details found on club website at
http://nevarc.org.au/

Matt's version of a serenity laden afternoon… knee deep in concrete!
Matt has been busy and keeping us informed of his amateur radio activities
He can't be the only one, how about sending your ham radio action news to be published for all to read…

New Antenna for VK3RWO

By Matt VK3VS/VK3SMB

Ever since the VK3RWO repeater was installed it has had a VHF High band antenna for the 2M radio. The Antenna was centred on 160 MHz. While this had an acceptable VSWR on 147 MHz, I have always accepted that the radiation pattern has not been that great. At 147 MHz there would have been lobes shooting into the sky.

Whilst this antenna has been performing OK, with the help of Dion, VK7DB I set about manufacturing a new 2M antenna for exactly 146.975 MHz.

The antenna I started with was a 70 – 85 MHz antenna. This antenna was a left over from a decommissioned commercial installation, and given the latest from the WIA and RASA that we would not get any of the 4M band in Australia due to the IARU and the commercial usage in VK, I thought it is time to give it a haircut with the hacksaw.

Dion has a great experience in using MMANA-GAL modelling software. I gave him the radius of the bends and the size of the pipe, and asked him to model it down to 146.975 MHz.

The answer given was that I needed an end to end of 934mm.

The top element was to come down to the centre line, and the bottom element was to stop short of the centre line by 20mm.

Cutting all complete….

The next hardest part was matching the antenna.

As we use 50 Ohms to the radio, and a Dipole is 292 Ohms (4 x 73ohm), a matching stub is needed.

$$Stub\ Z = \sqrt{50 \times 292}$$

$$Stub\ Z = 120.8 Ohm$$

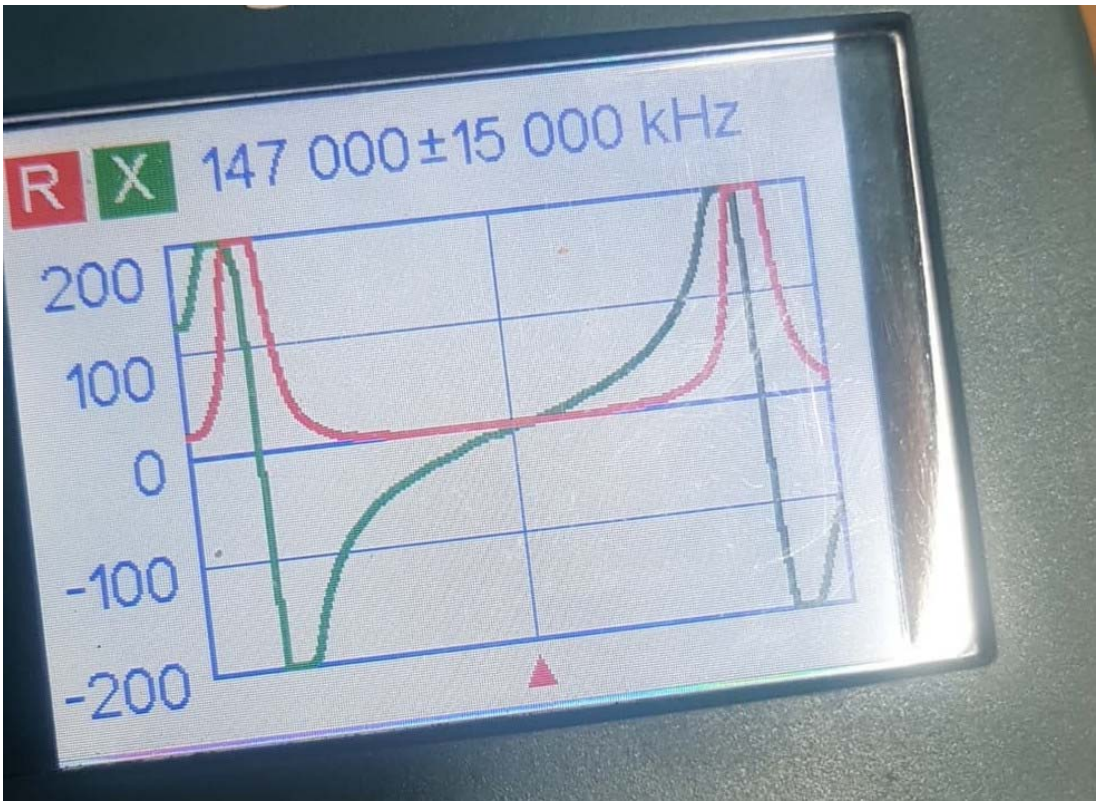
So an electrical quarter wavelength of 120.8 Ohm coax is needed. As it happens, the commercial guys have been using RG-63 Coax for years to match dipoles. This cable is 120 to 125 ohm depending on which datasheet you look at. It also has a velocity factor of .84.

So I needed a piece of RG63 that is:

$$length = 300 \div 146.975 \times .25 \times .84$$

$$length = 428\,mm$$

428mm long. Fortunately, the folded dipole I cut up had a piece around 700mm long. Instead of just cutting to maths, I have the fortunate pleasure of using an AA-1000 antenna analyser. With this I put the stub onto the analyser, and using the resistance (R) and reactance (X) graph, I was able to shorten the stub until the R and X crossed paths. This was the optimum length



The screen of the AA-1000

So after finding the correct length, I had to thread it back into the dipole and attach the braid to the top element and the centre conductor to the bottom element

The terminating of the coax.

So after gluing a piece of PVC pipe over the termination point and covering it in heavy walled heat shrink (it also has glue in it), it was time for a test.

Screen shots of the AA-1000 showing the resonance of the antenna.

Now All I have to do is take the antenna up the hill and install it onto the repeater.

The finished product, it is a monster compared to a VHF Highband one

'73, Matt, VK3VS/VK3SMB

VK3RWO forever surprising us

By Matt VK3VS/VK3SMB

In a previous article I wrote about making a new antenna for the 2m repeater at VK3RWO.
I set about doing this as over the last month, the signals were notably weaker at my QTH.
I put this down to we just had a lot of rain and all the trees etc were now natural attenuators.

Anyway, I packed a backpack of antenna tools and a couple of bits of test gear, put the new dipole over my shoulder and started the 7km walk UP the hill.
About half way up I remembered that I had left my portable at the bottom of the hill in my van.

Oh well I had a phone, and I knew both Gary VK2VU and Frank VK2BFC would be around for a test.
About 100m from the crest of the hill, Gary and I spoke on the phone so he could get some benchmark readings on some radios so he could tell me if there was any improvement.

While on the phone I was looking in the direction of the repeater.
I could see the fence to the compound, but, the next words out of my mouth were “Where is the f#$%ing repeater??”

Up the hill I went, only to be confronted with this:

What I found on the top of the hill

Not to be one to miss an opportunity, I unbolted the antenna and changed it while it was at head height, I thought it’s been this way for over a month, another 20 minutes is not going to make a difference.
The repeater cabinet weight in at 200kg, and has 4 star pickets, one in each corner.
All of them were down into the ground about 3 feet.
The front two had been bent, and the back two had been ripped out of the ground..

It must have been one hell of a gust of wind from the south to do that.
The cabinet must have come down in a hurry, as evident by the damage to the door

Door damage

The bit that has me perplexed the most: With the speed it fell, and angle of all the antennas, the NOT sealed batteries on their side and the solar panel looking at the ground, the bloody thing was still working…

THE REPEATER KEPT WORKING… FOR A MONTH… UP-SIDE-DOWN

Not trying to blow my own horn, but for any device to do that has certainly had the engineering put into it.

Given that I had not much more than a rusty old shifter, a couple of rags and an antenna analyser with me, I couldn't do that much on the day, other than remove the legs, stand it back up, bash the legs back into the ground with a rock, secure the cabinet back to the legs with the shifter and then pile rocks against the door to prevent it falling over again.

Sometime in between all that, the telemetry unit stopped working, so I unbolted it from the frame and put it in the back pack, and off I wandered again, back down the hill.
Sunday morning, I decided that I need to do something about the repeater.
I plugged the telemetry unit into my test bench, and found that it must have had a spike and lost its programming. Reprogrammed it and off it went again.

Off to Bunning's for a snag and some bags of rapid set concrete. I loaded the van with crow bars, shovels, buckets, water containers, and well almost everything I could think of that I might need, and started the trek up the hill again.
This trip was a bit easier considering I had more equipment.
It took 4 hours to dig several holes, mix concrete and pour it, then pile rocks onto the concrete to keep it there. The site is mostly sandy soil with chunks of sandstone in it, then after the first foot, turns to clay with quarts rock in it….. I certainly had my work cut out for me digging the holes.

The new concrete anchors

The start of the new rock garden

The Telemetry unit got plugged back in and started reporting straight away as the door of the cabinet was wide open.

I then set about doing the maintenance (list next page) that I would have done on my previous trip, had the thing not been upside down…..

Given that a repeater site has to look after itself, and it could be months between visits, here is a little list of the periodic maintenance that goes on, on a repeater site, particularly a solar powered one:

- Outside:
  - Check and tighten the tension of all the antenna mountings
  - Check and repair flying rat (cocky) damage
  - Clean the solar panel
  - Check the solar panel electrical connections
  - Re-tension the fence, thanks Skippy
  - Spray the weeds
  - Clean any fire hazards

- Inside:
  - Check for and remove unwanted house guests (snakes, rodents - however having said this, there will only be one or the other, not both!)
  - Load test the batteries
  - Check the tension and security of all RF connectors, particularly on the diplexer
  - Check the antenna resonance
  - Check the power output and frequency of the transmitters

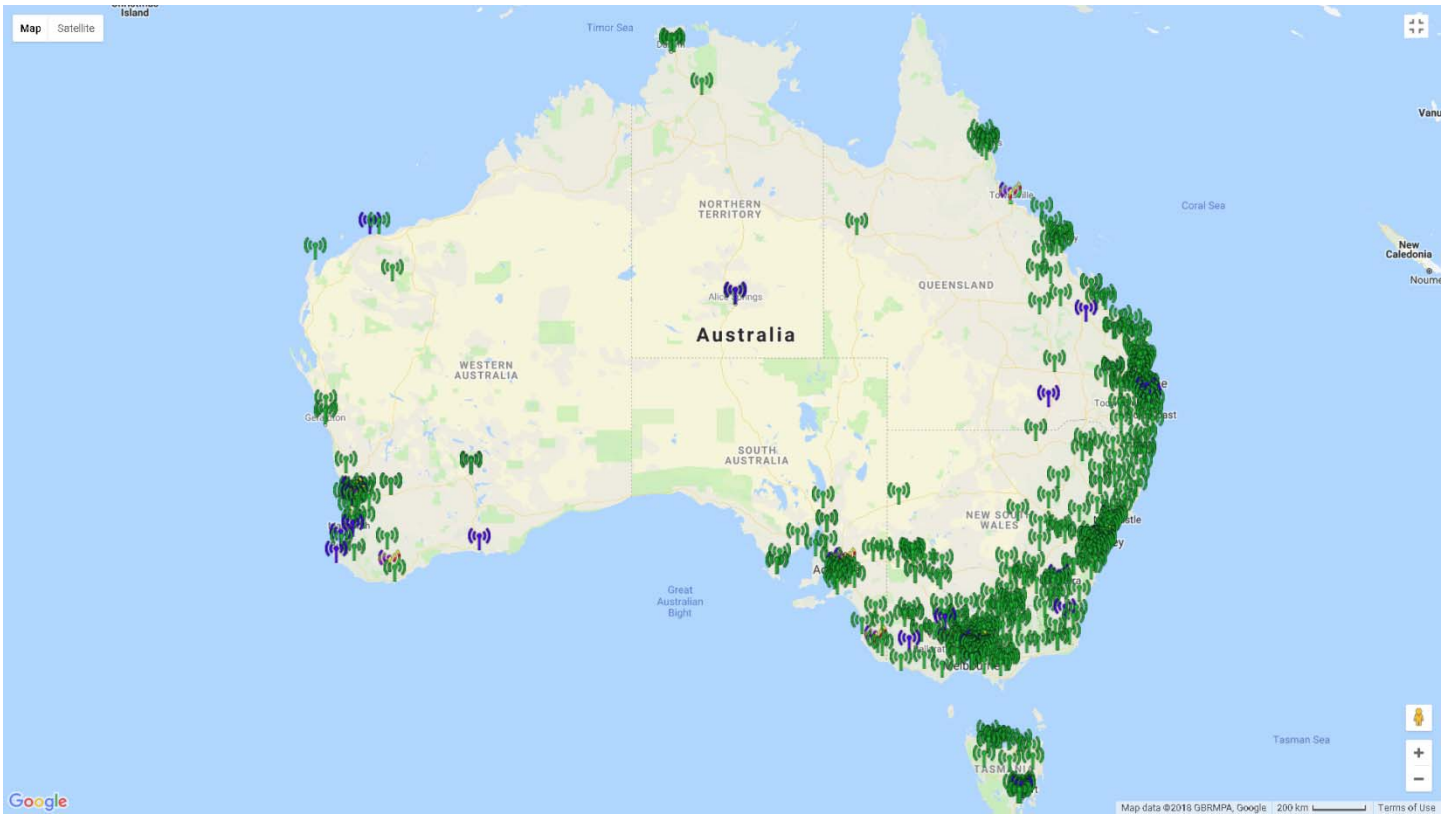
- On our site in particular:
  - Load any firmware updates into the controllers
  - check the telemetry is behaving and giving correct readings
  - Sit back and have a beer, enjoying the view
- Upon leaving:
  - Lock the damn door

The view

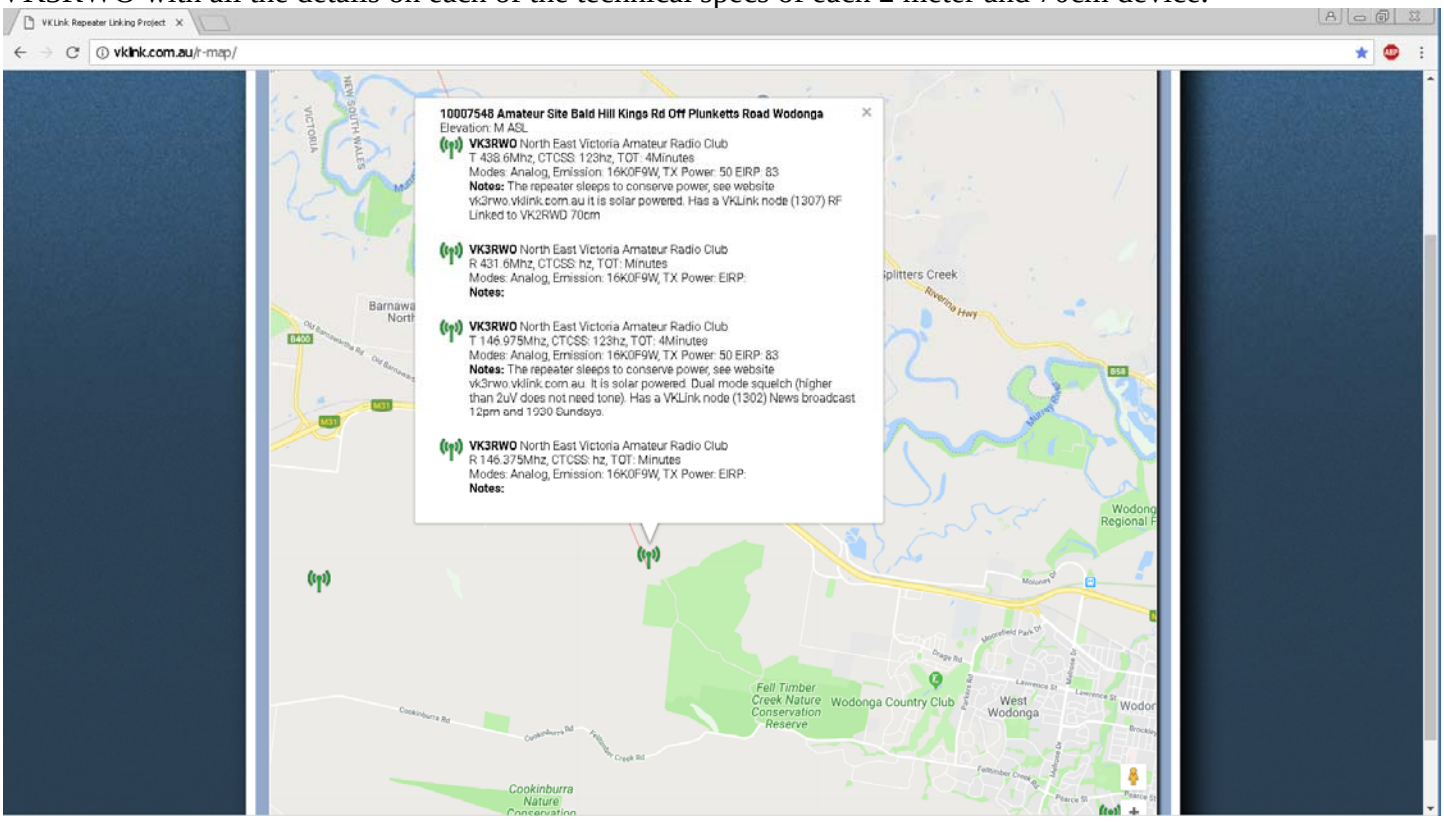
'73, Matt, VK3VS/VK3SMB

VK Repeater Map via the ACMA ~ Matt VK3VS/VK3SMB

Take a look at http://vklink.com.au/r-map/ for a map of all VK Repeaters from real time data kept by ACMA.



Zooming in and clicking the relevant symbol gives you all the information on any repeater site in VK, here is VK3RWO with all the details on each of the technical specs of each 2 meter and 70cm device.



It’s easy to navigate; the legend tells you each type of mode or use of whatever site you select, with all the info held on that site straight off the updated ACMA info they keep.

Start of the 6M VK2RWD Build

By Matt VK3VS/VK3SMB

The time has come to start thinking really hard about the 6M repeater the club has a licence for.
We have a licence for 53.5/52.5Mhz.

There is much discussion around the internet on how to make Cavities for 6M.

Some of the examples are:

- Pieces of LDF 650 made as notches – a set in Tasmania somewhere
- Modified VHF low band full length cavities (about 5” tall) – VK3RGV (I know I found them for the Shepparton club).
- Commercially built for 6M. $$$$$$

I have had in my possession now, for nearly 15 years (Back when I was going to build the 6m repeater for AWARC (TCREC back then), before my departure from an unhealthy organisation).

I have been hanging onto them for this moment.

The DB4032 cavities I have came as a 35 – 40 MHz set.
They are suited to a separation down to 500 kHz, with 2dB insertion loss.
At 500 kHz, the isolation is stated to be 80dB.

As received, the cavities were set up for 2 transmitters and one receiver into one antenna, and it was missing some coax.

Decibel Products, Inc.

BAND-REJECT DUPLEXER
30-50 MHz

DB-4030
DB-4032

Models DB-4030 and DB-4032 are designed for use with duplex systems operating in the 30-50 MHz band. These models include the use of quarter-wave helical resonators interconnected in a band-reject configuration with double shielded cable. Both models are temperature compensated and will provide powers up to 150 watts - even at the extremes of the temperature range. The compact size of these duplexers is made possible by use of the high performance helical resonators. Both models include the cabinet.

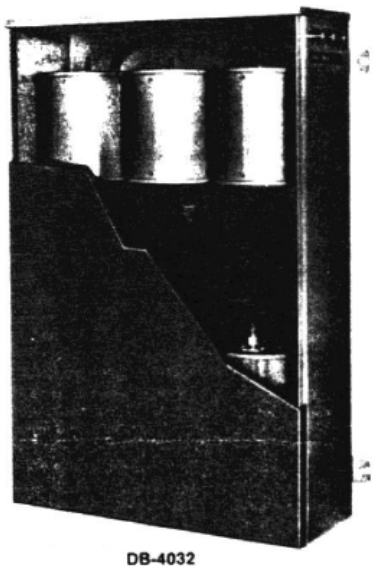
Model DB-4030 is a 4-cavity duplexer with two cavities in the transmitter section, two in the receiver section. The duplexer is generally suitable for use with most tube type and/or solid state type stations when the transmit and receive frequencies are separated by 1.5 MHz or more.

Model DB-4032 is a 6-cavity duplexer with three cavities in the transmitter section, three in the receiver section. The duplexer is generally suitable for use with most tube type and/or solid state type stations when the transmit and receive frequencies are separated by 0.5 MHz or more.

The duplex response curves illustrate the typical isolation provided by the duplexer when operated at minimum frequency separation. Insertion loss values at minimum frequency separation are shown in the specifications. At greater separation between the transmit and receive frequencies, the rejection remains the same but the transmitter and receiver losses are reduced.

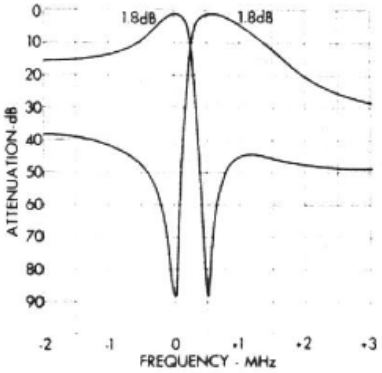
The duplexer is factory tuned to the exact operating frequencies and shipped ready for immediate installation. No further field tuning or adjustment is normally required.

COMBINING. Under certain conditions, the **DB-4032** is suitable for coupling two transmitters, two receivers or two simplex stations into a common antenna when the two frequencies involved are separated by 0.5 MHz or more.



DB-4032

TYPICAL DUPLEX RESPONSE CURVES



Model DB-4032

ELECTRICAL DATA

	Model DB-4030	Model DB-4032
Frequency ranges	30-35 MHz	30-35 MHz
	35-40 MHz	35-40 MHz
	40-45 MHz	40-45 MHz
	45-50 MHz	45-50 MHz
Frequency separation	1.5 MHz or more	0.5 MHz or more
Maximum power input (continuous duty)	150 watts	150 watts
Insertion loss - transmitter to antenna	1.5 dB	2.0 dB
Insertion loss - receiver to antenna	1.5 dB	2.0 dB
Transmitter noise suppression at receiver frequency	55 dB	80 dB
Receiver isolation at transmit frequency	55 dB	80 dB
Maximum VSWR (referenced to 50 ohms)	1.5 to 1	1.5 to 1
Temperature range	-30° to + 60°C	-30° to + 60°C
Number of cavity filters	4	6

MECHANICAL DATA

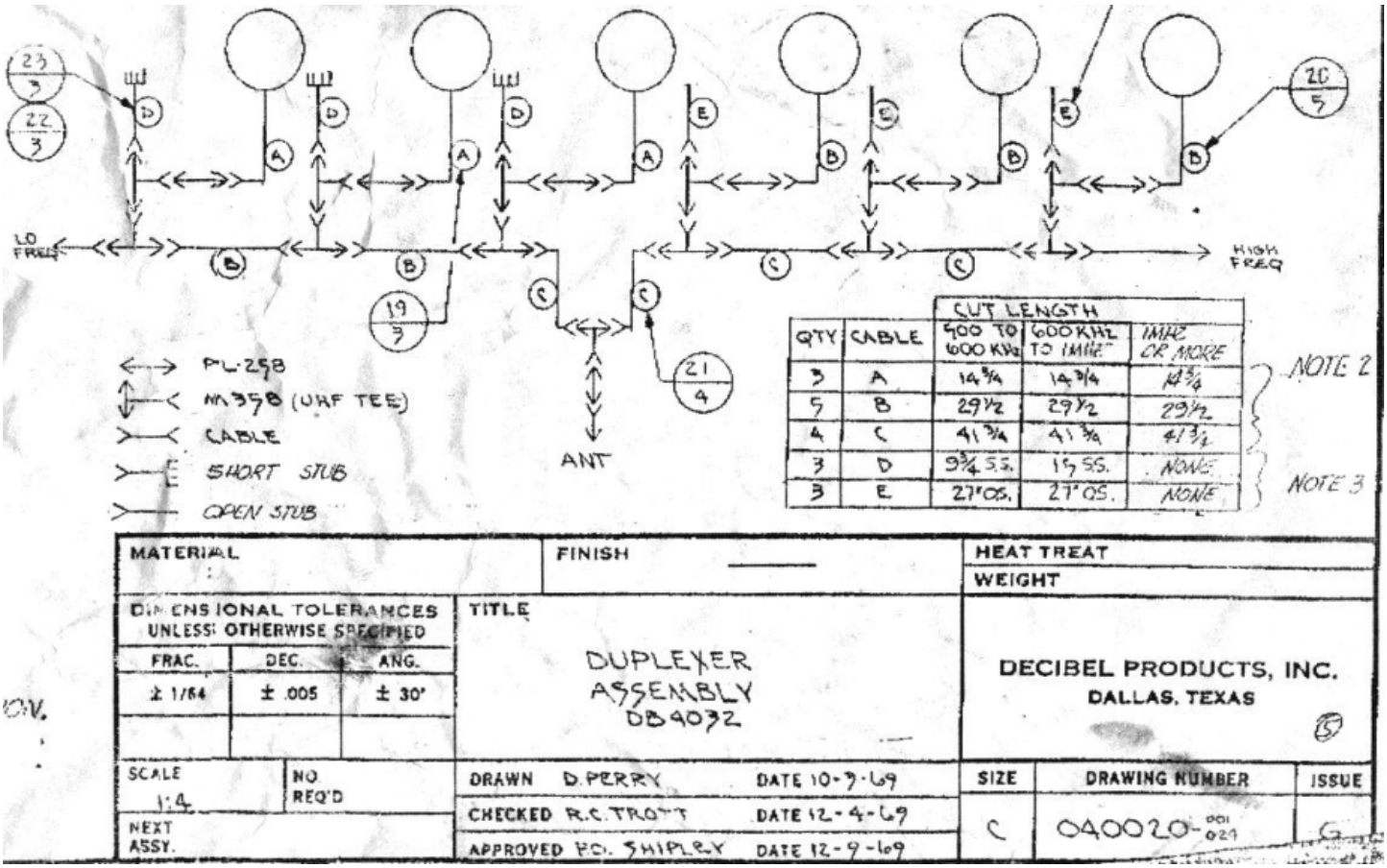
	Model DB-4030	Model DB-4032
Cabinet dimensions:		
Height	30"	30"
Width	19.250"	19.250"
Depth	7.380"	7.380"
Connector terminations	UHF female	UHF female
Finish	Decibel Brown	Decibel Brown
Net Weight	67 lbs.	75 lbs.
Shipping Weight	77 lbs.	90 lbs.

ORDERING INFORMATION

DB-4030 Duplexer 30-50 MHz
DB-4032 Duplexer 30-50 MHz

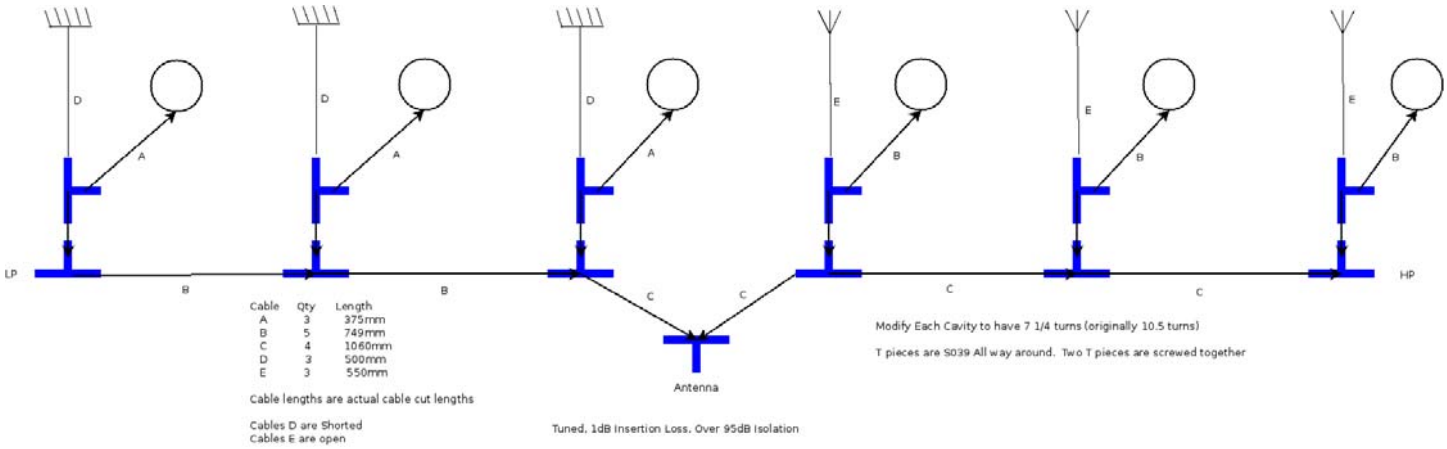
Exact Frequency of the transmitter and the receiver must be specified.

Finding an old photo of what the interconnect cables are supposed to be for a full duplex diplexer I re-arranged the cavities to suit.
Drawn in 1969…..



Then came the task to modify them to suit 6M. I set up a jig to cut the helix filters at ½ a turn at a time.
This raised the resonance of the cavities towards 6m. HOWEVER, it also completely wrecked (lowered) the "Q" of the cavity as well. So, I had to start modifying the stubs as well to attempt to keep raise the "Q" again.

After a lot of trial and error, I ended up with a cavity that showed similar "Q" to the original design, AND was cantered at 53.750 for the high pass, and 52.750 for the low pass.
I ended up removing 3 ¼ turns from the helical coils in the cavity (giving me 7 ¼ turns), and ended up with Coax Stubs between 500 and 550mm long.

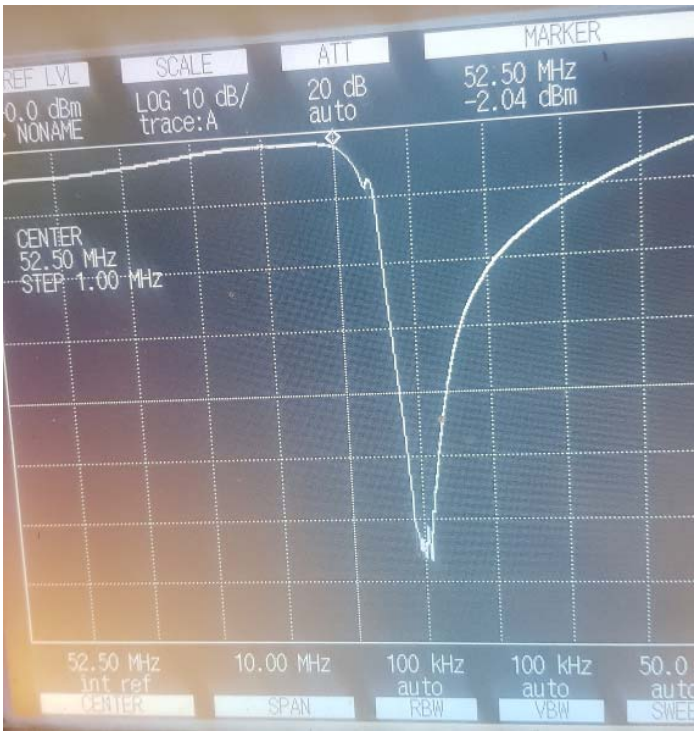


My diagram and lengths to suit the 6M band.

With the pathetic leads I was using to test the cavities (some old rg58) with the right ends already on them, I had just on 1 dB of loss through them. I could have zeroed out the analyser to compensate, however, it was fine for what I was wanting to see.

Tuning cavities is a black art.
You start from one end and work your way across the cavities. However, the moment you touch the next one, the first one moves out of tune again… These cavities are relatively simple.
They are only Notch filters configured as high pass and low pass, unlike the cavities on VK3RWO, the are pass/reject cavities, meaning there is a passband that has to be set, and then go back and sort the notch out…
12 Adjustments that all interact again….

I have been playing with cavities for years, and know that if I do this to the next one, the first one does that, so therefore, I need to detune this to compensate for that, and keep all that in my head for 6 cans that all interact. Its just experience that allows me to do that... It's not something that can be taught.

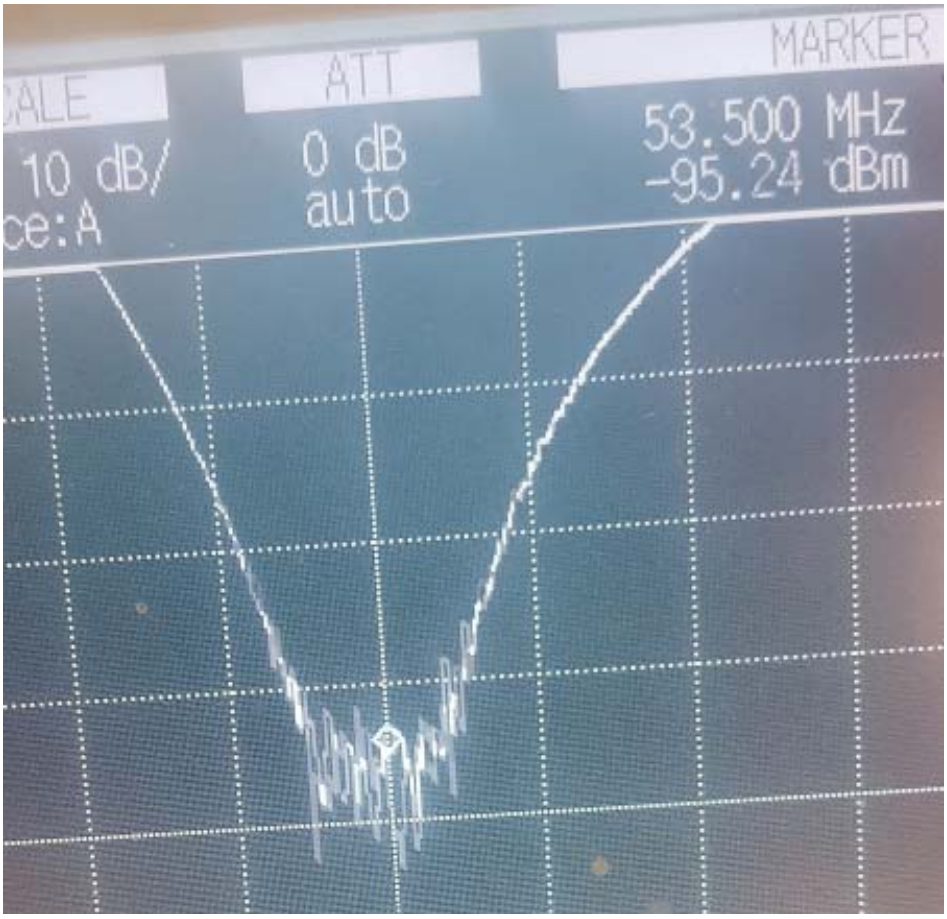


This is why there is NO inter-modulation on VK3RWO 2M or 70cm, nor on VK2RWD, I tuned/modified the diplexers for them all.

Perhaps I need to give the AWARC guys a hand to sort out VK2RAY…….

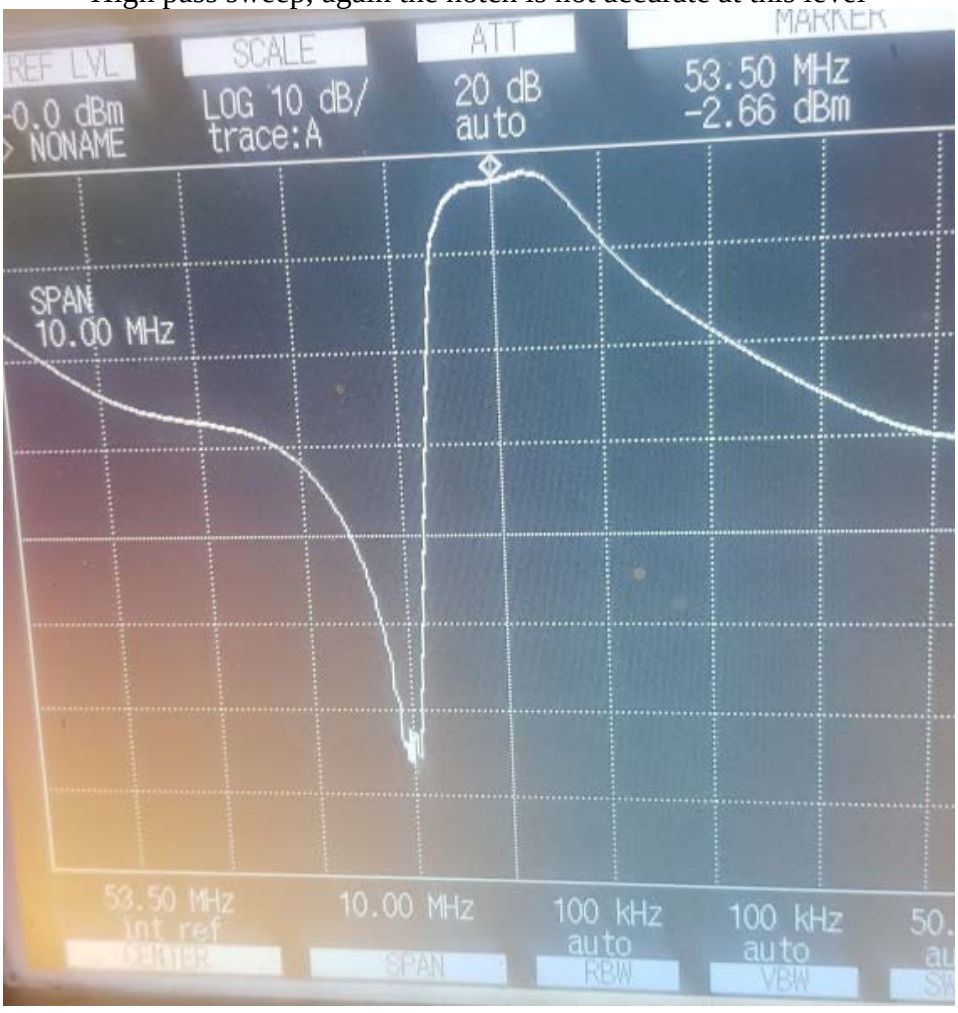
So after 2 hours of playing, adjusting, playing and adjusting, I got a pattern on the spectrum analyser that I was happy with.

Low pass sweep.
Note the notch is not accurate at this level

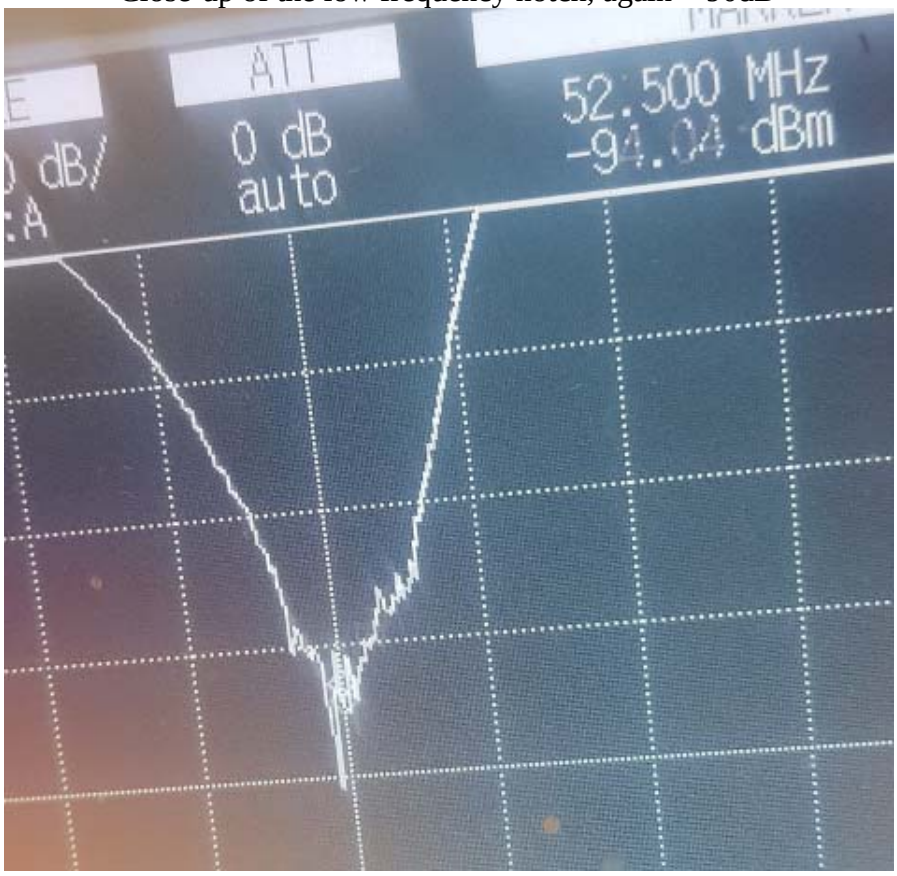


Close-up of the high frequency notch, note > 90dB of notch

High pass sweep, again the notch is not accurate at this level



Close-up of the low frequency notch, again > 90dB



As you can see from three previous photos, keeping the “Q” nice and high gives the cavities a really steep curve from pass to notch, and allows us to have a 1 MHz split. I could play around with the matching a little more, particularly on the high pass, and achieve a lower insertion loss and 90dB of isolation, however, I would only gain 1 dB at the other end, and that is nothing in reality.
I would rather have isolation into the noise floor and slightly higher insertion loss.
I am not wasting half a day or more over 1dB….. I'll let Gary worry about that.
So there it is, a full set of cavities to suit our 6M repeater, that won’t take up half of the hut to install them. Here's hoping we can get the whole plot installed for the summer of ducting.
With the holes in the cabinet plugged, and all the interconnect cables secured, here is what the finished product looks like. Perhaps I should sit down and make a folded dipole for 6M too.

The Finished product '73, Matt, VK3VS/VK3SMB

New Filters for VK3RTV

The Melbourne Digital Amateur Television Repeater, VK3RTV was decommissioned form its old site at Olinda some months ago.
The new site will be shared with other services with frequencies much closer to those used by VK3RTV.
So the need for much better RF filtering is required.
Peter Cossins held an info night to explain at EMDRC recently.
The spectrum analyser sweeps show the vast improvements.
The repeater was tested for a week and then the whole site room at Surrey Hills is to be refurbished over the next few months.
VK3RTV will then be restored into service. The really good news is that the filter paid for by the Eastern and Mountain Districts Radio Club and Amateur Radio Victoria has solved all problems. Peter was talking direct to Motorola Officers monitoring their system when he switched on VK3RTV. No interference has been reported. The outlook towards Geelong looks promising; even on the ground under the tower you can see the bay.

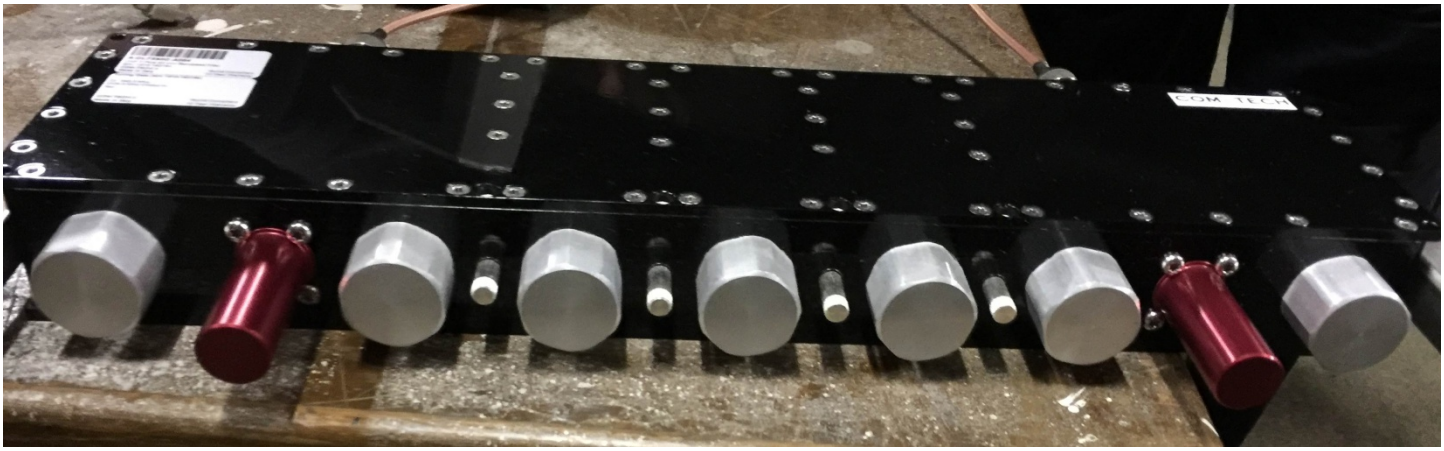
Peter giving his talk

Old filter

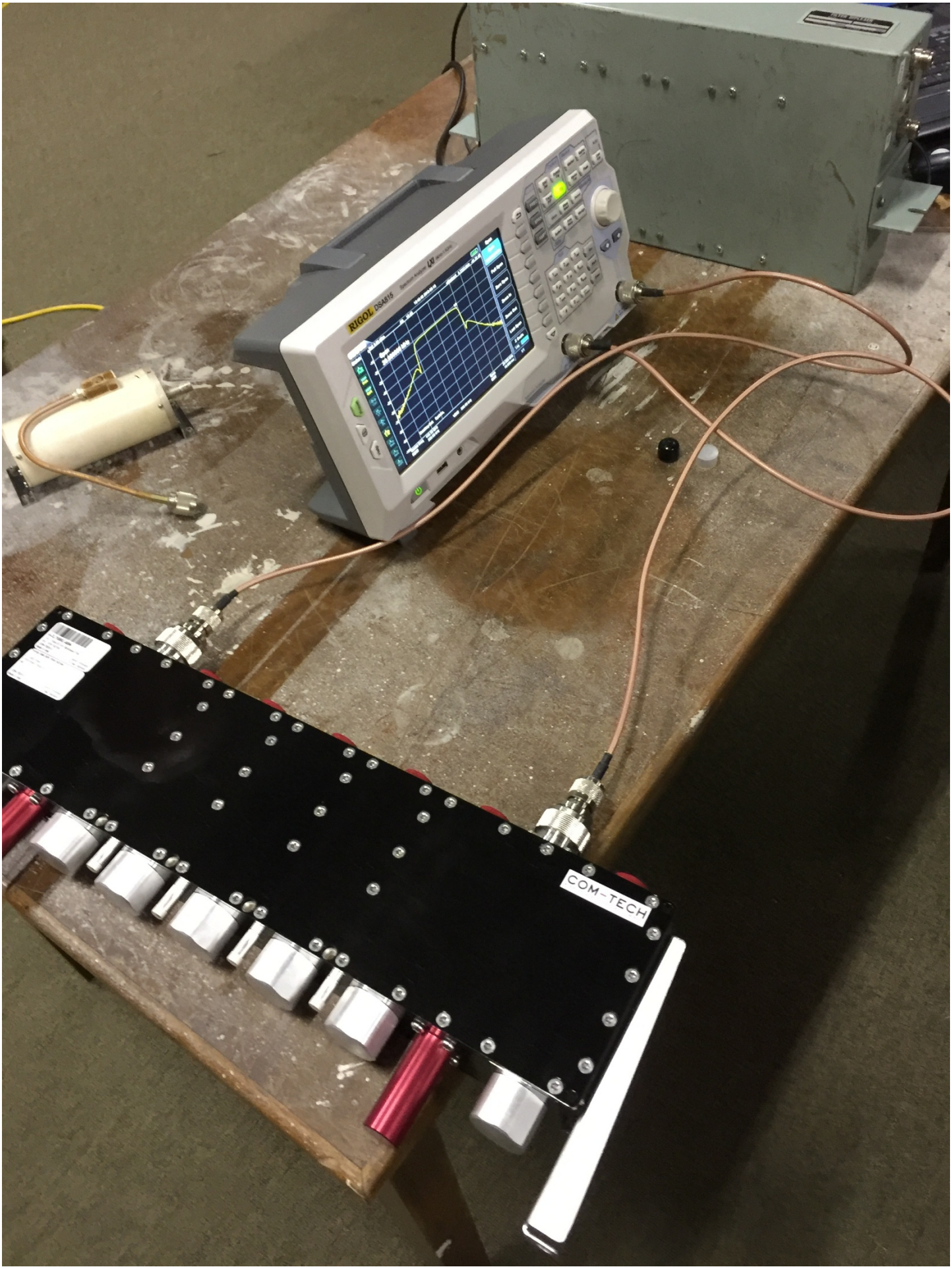
Old filter sweep

The inside of the old filter

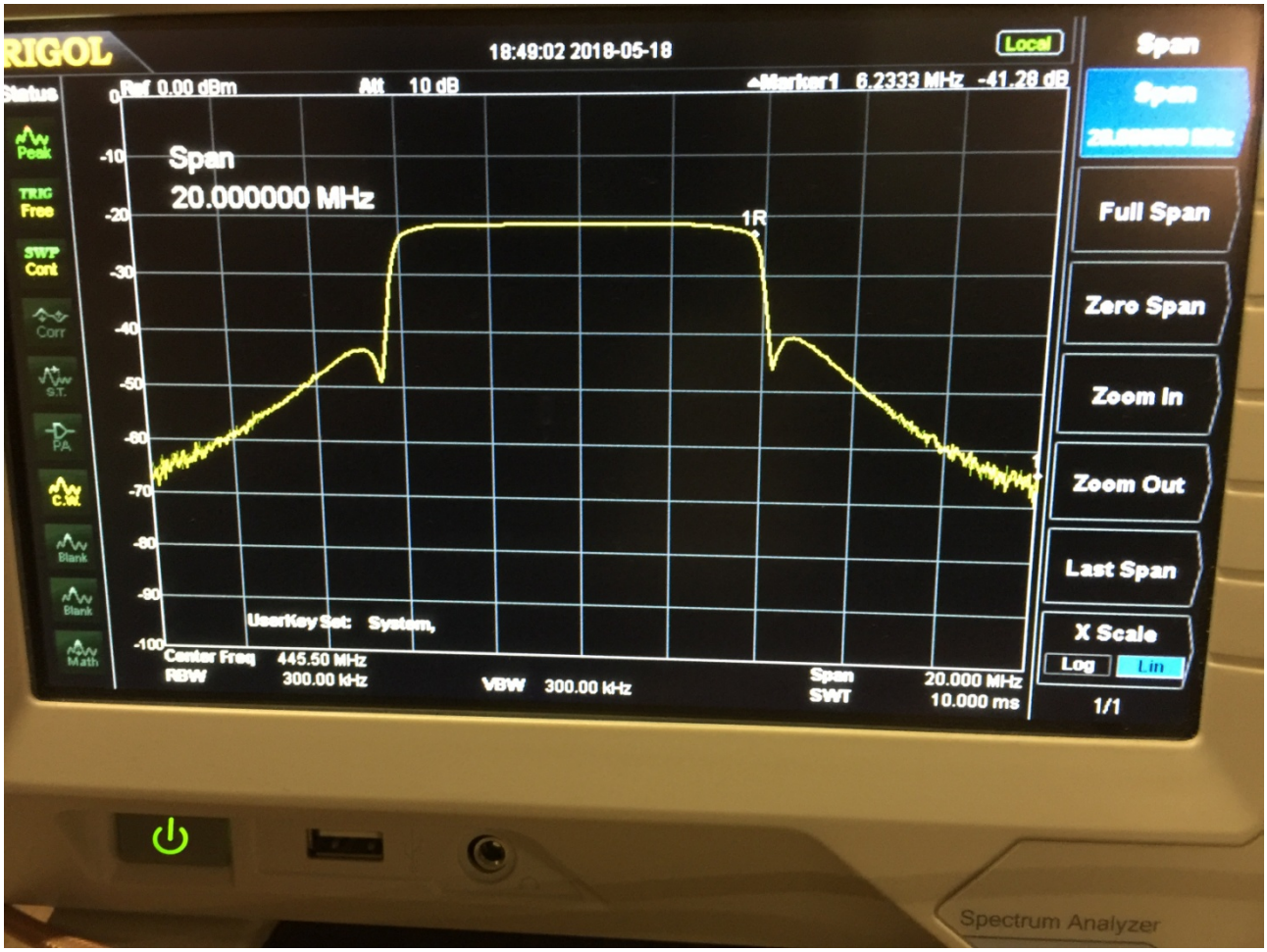
Old filter spec plate



The new commercial grade filter

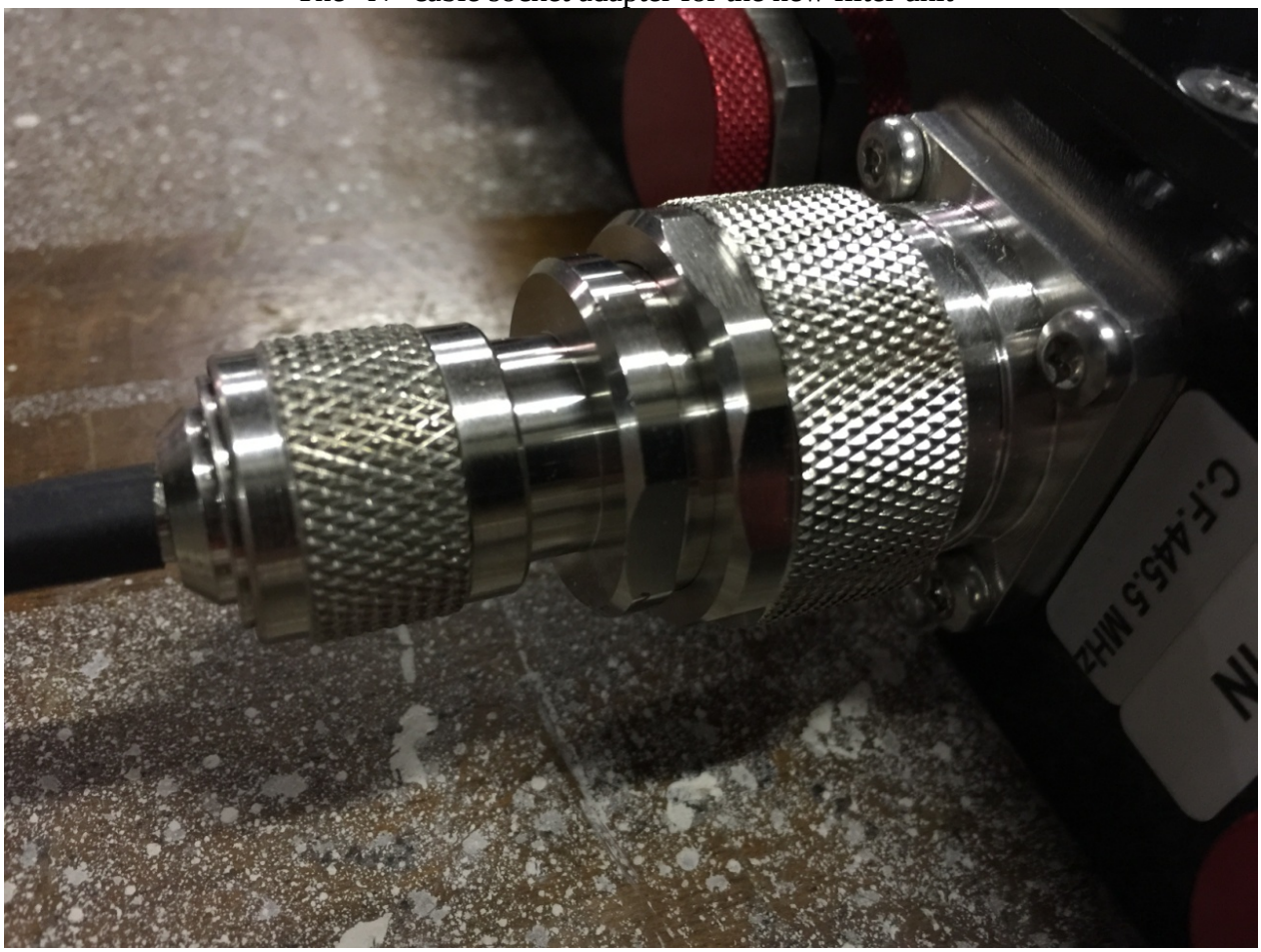


The new filter sweep, utterly near razor sharp roll off



Sweep screenshot

The “N” cable socket adapter for the new filter unit



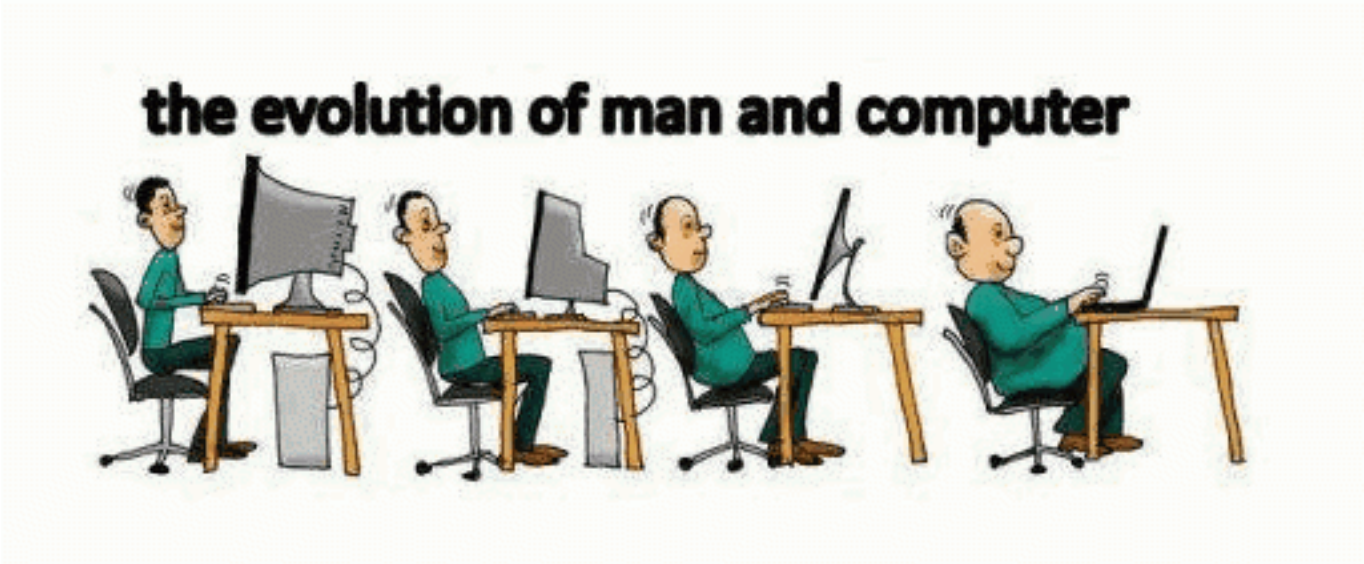
~Mick VK3CH

A 3-year-old boy examined his testicles while taking a bath.
‘Mum’, he asked, 'Are these my brains?'
'Not yet, ' she replied.

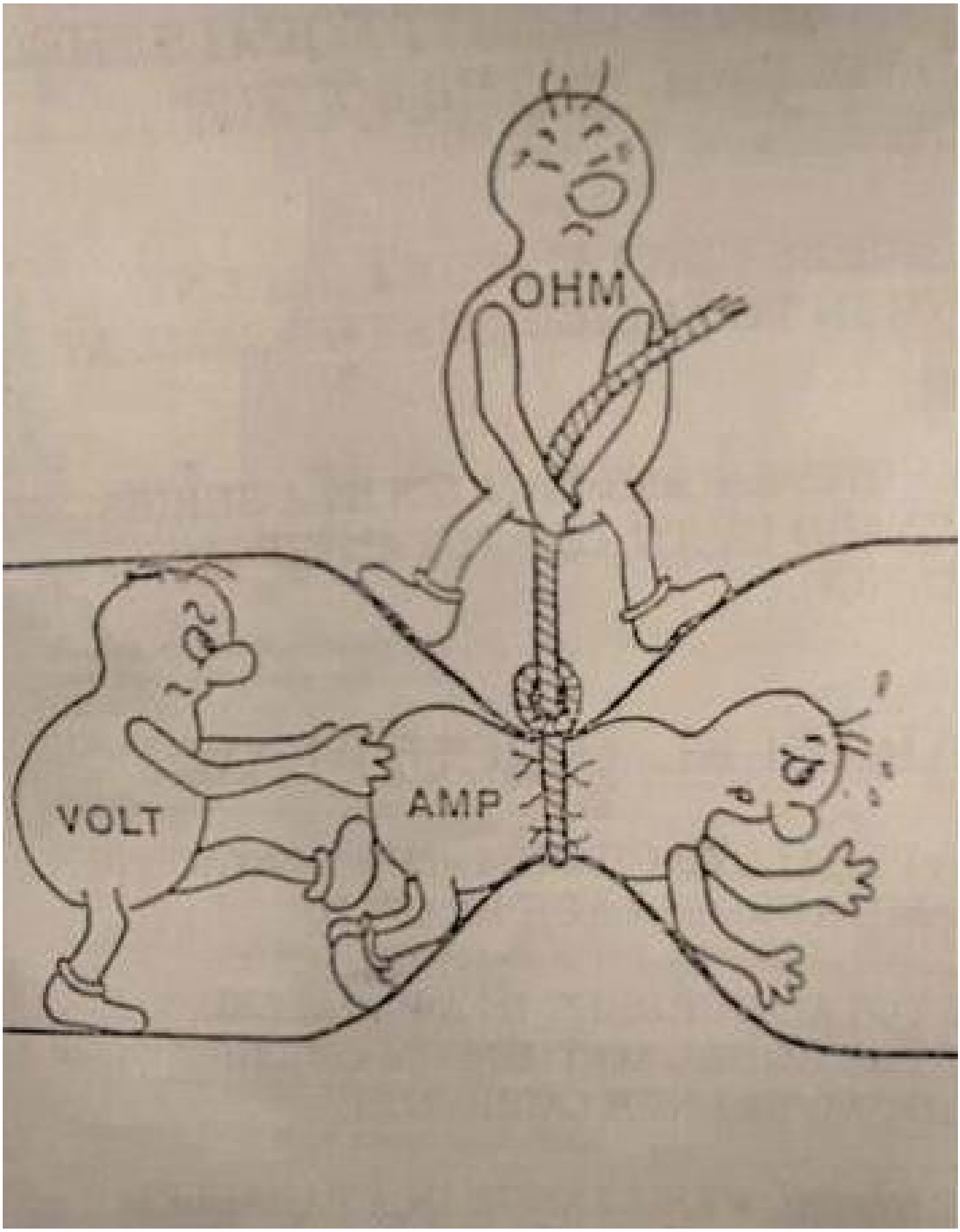
Q. What is the biggest lie in the entire universe?
A. “I have read and agree to the Terms & Conditions.”

Autocorrect has become my worst enema.

Anyone who thinks “talk is cheap”… obviously didn’t pay my daughter’s last mobile phone bill!



Ohms Law Simplified



WIA Submission – Part 1: General principles

1.1 The Future of Amateur Licensing

The general principle guiding the WIA in this submission is that, during the introduction of new legislation, amateur licences should not be downgraded from the current position embodied within Apparatus licensing.

1.1.1 General principles of amateur licensing

Under the prevailing licensing system, Australian radio amateurs are able to expect:	Standard and Advanced licensees operate stations comprising equipment that may be:
• individual licences • certainty of licence tenure, with periodic renewal • certain and continuing access to frequency bands throughout the radiofrequency spectrum • defined technical parameters • certain and continuing participation in spectrum management processes at local, national and international levels.	• designed and constructed by themselves • constructed from kitsets produced for the local or global amateur radio market • assembled from units of commercially manufactured equipment originally intended for commercial, government or defence applications, and adapted or modified for amateur radio pursuits • assembled from commercially manufactured equipment designed for the world amateur radio market • various combinations and permutations of the above.

The WIA welcomes a discussion on licensing options in the case of the Foundation grade licence, with a view to reducing licensing costs.

1.1.2 WIA Survey: Item1 – Future of amateur licensing

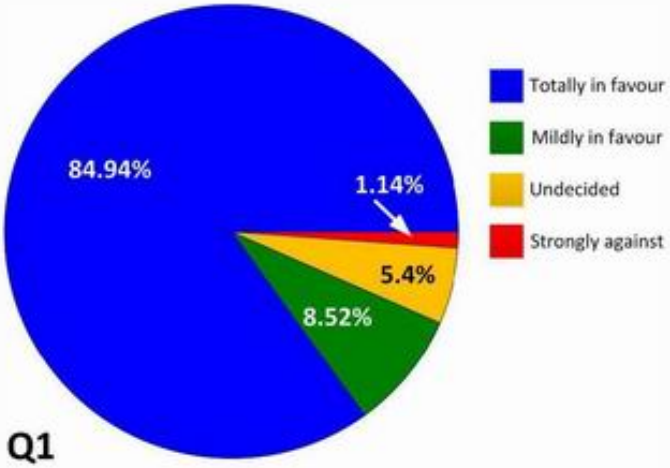
It is understood that the new radiocommunications act will introduce a form of licence known as "parameters-based licensing".

The WIA proposes that future amateur licensing must not be reduced or downgraded from the principles embodied in current Apparatus licensing.

Respondents were asked their view on this proposition, with a choice of four responses.

Future licensing not downgraded

N = 352	Totally in Favour	Mildly in Favour	Undecided	Strongly Against
No.	299	30	19	4
%	**84.9**	**8.5**	**5.4**	**1.1**



Q1

Future licensing not downgraded from current principles

Over 93% of respondents supported the view that Amateur licences should not be downgraded. Of those Opposed to the proposition, some held that future amateur licensing should be more stringent, while others took 'Strongly Against' to mean against downgrading. Among those Undecided who commented,

there was a view that related regulation (eg, EMI/RFI of electronic products) needed to be upgraded to combat RF noise.

WIA Recommendation:

That the status of Amateur Advanced and Standard grade licences not be downgraded from the current position embodied within Apparatus licensing.

1.2 Reducing regulation

The amateur radio hobby is highly regulated, in order to prevent interference between the amateur service and other radio communications services.

However, the pace of technological change has accelerated greatly and amateur licensees now find themselves restricted and often unable to experiment with the full range of technologies available. This impediment will become greater in the future as technology advances.

The WIA is of the view that there is scope to relax the technical regulations on the amateur service to allow licensees to take part in new and yet-to-emerge technologies, without the burden of overly restrictive regulation.

The WIA also believes there is scope for greater self-determination by the amateur service.

1.2.1 WIA Survey: Item 2 – Reducing regulation

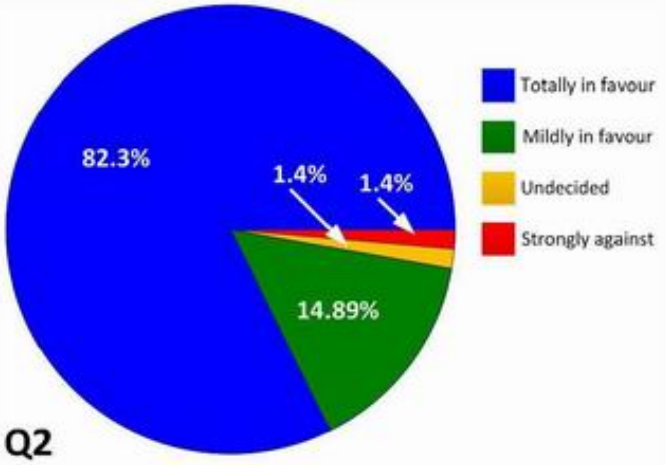
Reducing regulation to provide greater self-determination for Amateur operators.

The WIA proposes that future amateur licence conditions must encourage and support every opportunity for amateurs, of whatever licence class, to explore, experiment and learn with the least possible impediment, balanced with responsible use of the radio spectrum and respect for other users.

Respondents were asked their view on this proposition, with a choice of four responses.

Reducing regulation to provide greater self-regulation

N = 356	Totally in Favour	Mildly in Favour	Undecided	Strongly Against
No.	293	53	5	5
%	**82.3**	**14.9**	**1.4**	**1.4**



Q2

Reducing regulation to encourage experimenting & learning

An overwhelming majority, more than 97% of respondents, supported a reduction in regulation to provide greater self-determination for the Australian amateur community. Of those Mildly in Favour, views were expressed concerning maintenance of conservative regulation. Those Strongly Against the proposition said that future amateur regulations should be more stringent than at present.

WIA Recommendation:

That the WIA and the ACMA explore options for greater self-determination by the amateur service, possibly by developing an industry code.

1.3 Review of permitted powers

Amateur operators in Australia are at a significant disadvantage compared to those in other countries, where administrations allow higher, or significantly higher, transmitted power.

The communications distances within Australia are generally greater than in many other countries. Our urban noise floors are steadily rising from the multitude of new electronic sources that generate EMI/RFI. Urban noise floors in other countries suffer the same problem.

The WIA believes that all licence classes would benefit from an increase in permitted power. This is particularly relevant in the case of Foundation licensees. Many other countries' radiocommunications administrations permit their radio amateur licensees greater transmission power than the current Australian amateur licence conditions.

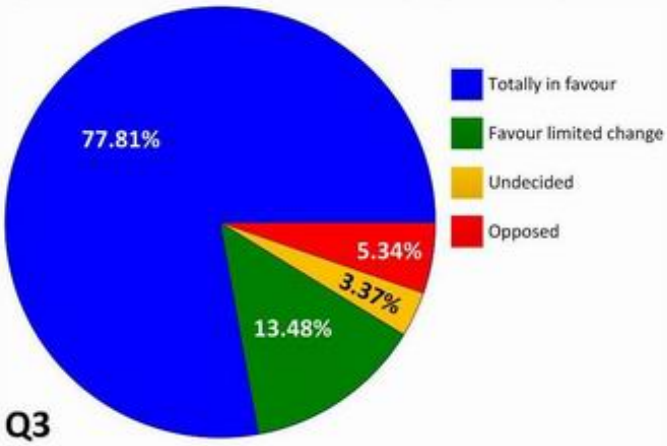
While there is interest within the radio amateur community in operating with 'low' powers (below 5 W pX/pY, for example), there are also those interested in the technologies, techniques and use of various power levels for communications, particularly under anomalous propagation conditions. In addition, some modes of communication, such as reflecting signals off passive space objects (eg, meteor trails, moon bounce), require power levels above the maximum currently permitted for the Advanced licence.

1.3.1 WIA Survey: Item 3 – Permitted powers

On-air conditions are affected to varying degrees by the 'fog' of electromagnetic interference from a multitude of sources. This seems set to continue and expand as the use of electronics and wireless technologies grows. Amateur operator interests and pursuits range across low power operations to high power techniques and operations.

The WIA proposes that permitted powers for all licence grades be reviewed in a sensible, pragmatic way to enable licensees to pursue their interests commensurate with their knowledge (as established in their AOCP assessment or practice, education and experience), and within reasonable bounds of public and personal safety regarding electromagnetic emissions.

Respondents were asked their view, with a choice of four responses.



Q3

Sensible review of permitted powers for all licence grades

Review of permitted powers

N = 356	Totally in Favour	Favour Limited Change	Undecided	Opposed
No.	277	48	12	19
%	**77.8**	**13.5**	**3.4**	**5.3**

Over 91% of respondents supported sensible, pragmatic changes to the permitted power levels within the bounds of public safety. The general view of those Favouring Limited Change, was that caution necessitated increases be incremental. Those Opposed to change, expressed the view that current permitted powers were satisfactory. No view was expressed by those signifying Undecided, but they were otherwise in favour of change in response to the two prior questions.

WIA Recommendation:

The WIA's specific recommendations for increases in permitted powers for each licence grade are provided elsewhere in this submission.

WIA Submission – Part 2: Foundation Licence Conditions

SUMMARY

- Permit use of digital transmission modes
- Relax permitted transmission bandwidths
- Add access to more frequency bands
- Increase maximum power from 10 W to 50 W pX
- Relax conditions to enable limited home construction and use of re-purposed transmitting equipment
- Identify a 6-character callsign range to replace the current 7-character callsigns

2.1 Foundation Licence Conditions – Transmitting Modes as in LCD 2015

Part 6

29 Emissions from an amateur foundation station

The licensee must not operate an amateur foundation station in a frequency band mentioned in column 1 of an item in Schedule 3A unless:

(a) it is operated using an emission mode mentioned in column 2 of that item; and

(b) if the emission mode is 200HA1A – the information to be transmitted by the station is sent by the use of a manually operated Morse key; and

(c) the transmission remains entirely within that frequency band.

Schedule 3A Permitted frequencies and emission modes (amateur foundation station)

(sections 27 and 29)

Item	*Column 1* Frequency band	*Column 2* Permitted emission modes
1	3.500 MHz–3.700 MHz 7.000 MHz–7.300 MHz 21.000 MHz–21.450 MHz	200HA1A 8K00A3E 4K00J3E
2	28.000 MHz–29.700 MHz 144.000 MHz–148.000 MHz 430.000 MHz–450.000 MHz	200HA1A 8K00A3E 4K00J3E 16K0F3E 16K0G3E

2.1.1 Permitting use of digital modes

It is anachronistic in an era when digital communication is the underlying infrastructure to daily life, that Foundation licensees are denied the opportunity to learn and experience the use and applications of digital communications.

The WIA notes that the entry-level licence conditions in a number of other countries have included digital modes and image transmissions since inception, and to the WIA's knowledge without reports of noteworthy issues. The entry-level licences in Argentina, Canada, Japan, USA and the UK are cases in point.

The WIA also notes that non-licensed persons are afforded an opportunity to experiment with modern digital communications techniques using the freely available class-licensed LIPD bands. However, persons who have undergone the extra training and accreditation in order to achieve an Amateur Radio Foundation grade licence do not have the same learning opportunities presented to them through Amateur Radio.

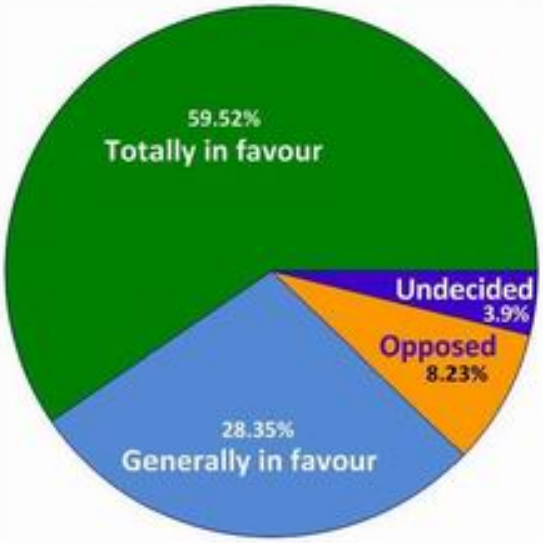
With increasing technology development, and the use of digitally-generated transmission modes, particularly with Software-defined Radio (SDR), the WIA believes that selecting permitted modes based on current and past practice is an unnecessary hindrance to future experimentation that also unnecessarily adds to the regulatory burden.

2.1.2 WIA survey - Permitting use of digital modes

Survey participants were asked their view of the desirability of access to digital modes of communication, with a choice of four responses.

Foundation Licence – use of digital modes

N = 462	Totally in Favour	Generally in Favour	Undecided	Opposed
No.	275	131	18	38
%	**59.5**	**28.4**	**3.9**	**8.2**



Phase 2: Foundation – use of digital modes

Over 87% of respondents favoured allowing Foundation Licensees to use digital modes. The 28% Generally in Favour expressed the view that it be limited to a prescribed range of modes. Those Opposed expressed views that adding permission for digital modes was providing 'unearned' and unassessed privileges, that use of digital transmission was 'unsafe' with neophyte licensees and was a disincentive to upgrade. Undecided respondents expressed no views.

WIA recommendations:

That Foundation licensees be permitted to use a range of digitally-produced data modes, including (but not limited to) text transmission (eg, RTTY, PSK-31, FT8), digitally-mediated voice transmission (eg, CFM, D-Star, DMR, FreeDV), and image transmission modes (eg, facsimile, video, CGI).

That **Schedule 3A** be amended so that Column 2 has the same or similar wording to **Schedule 2** (Advanced) and **Schedule 3** (Standard), except where otherwise necessary. Consequent amendments to **Part 6, Clause 24** may be necessary.

2.2 Foundation Licence Condition – Permitted bandwidth

2.2.1 Relaxation of permitted bandwidths

In keeping with the principle of enabling licensees to explore the use of more transmission modes, whether extant or yet to emerge, the WIA suggests that permitted bandwidths be reviewed so as to reduce prescriptive specifications wherever practicable. This works in conjunction with 2.1 above (digital modes) and adds to the general vision of expanding operators' learning opportunities.

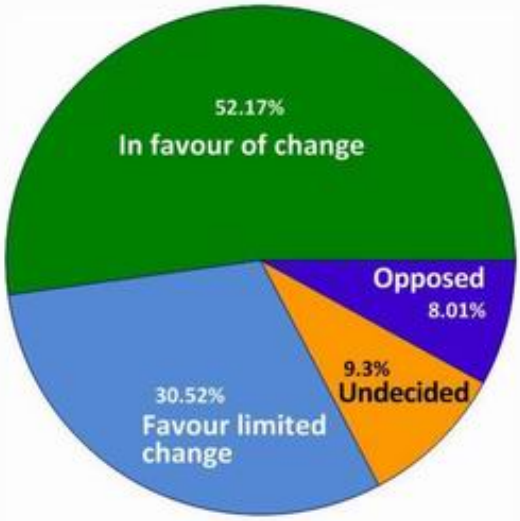
2.2.2 WIA survey - Relaxation of permitted bandwidths

This is about accommodating the future, and future technologies.

Survey participants were asked their views about access to greater bandwidths than currently permitted, with a choice of four responses.

Foundation Licence – relax bandwidths

N = 462	In Favour of Change	Favour Limited Change	Undecided	Opposed
No.	241	141	43	37
%	**52.2**	**30.5**	**9.3**	**8.0**



Phase 2: Foundation – relax bandwidths

Over 82% of respondents favoured an increase in permitted bandwidths for Foundation Licensees. Of the 30% Favouring Limited Change, the general view came down to limiting opportunities for on-air inter-operator interference and poor quality transmissions. Those Opposed expressed a view that enabling use of transmission modes other than those currently permitted was 'unsafe' with neophyte licensees, provided 'unearned' and unassessed privileges, and a disincentive to upgrade. Respondent numbers signifying Undecided were consistent with prior propositions, except section 2.1.2.

WIA Recommendation:

That **Schedule 1 Emission Modes** be reduced to a practicable minimum to avoid prescribing emission modes in every detail.

That **Part 6, Clause 29 - Emissions from an amateur foundation station** - could be reduced to:

The licensee must not operate an amateur foundation station in a frequency band mentioned in column 1 of an item in Schedule 3A unless the transmission remains entirely within that frequency band, except where transmission bandwidth is otherwise specified.

2.3 Foundation Licence Condition – Frequency bands as in LCD 2015

Part 6

27 Permitted frequency bands

The licensee must operate an amateur foundation station to transmit only on a frequency in a frequency band mentioned in column 1 of an item in Schedule 3A.

Schedule 3A **Permitted frequencies and emission modes (amateur foundation station)**

(sections 27 and 29)

Item	*Column 1* Frequency band	*Column 2* Permitted emission modes
1	3.500 MHz–3.700 MHz	200HA1A
	7.000 MHz–7.300 MHz	8K00A3E
	21.000 MHz–21.450 MHz	4K00J3E
2	28.000 MHz–29.700 MHz	200HA1A
	144.000 MHz–148.000 MHz	8K00A3E
	430.000 MHz–450.000 MHz	4K00J3E
		16K0F3E
		16K0G3E

2.3.1 Access to more bands

Table 2.1 (next page) provides a comparison of band access provisions for entry-level amateur licences in eight comparative countries. With only six permitted bands, the current Australian Foundation licence band access conditions are readily seen as unnecessarily restrictive when viewed in comparison with other countries' entry level licences.

Traditionally, entrants to amateur radio came through the special interest routes of shortwave listening, CB radio or an interest in electronics. Newer, younger entrants to amateur radio are more likely to approach amateur radio via an interest in more modern technologies such as IT wireless applications, WiFi (microwave bands), drones, astronomy (and radio astronomy) and like STEM pursuits that predominantly involve higher frequencies than those of past eras.

The UK Foundation licence, on which the Australian Foundation licence was initially modelled, now provides access to 16 bands, covering LF through to UHF and microwaves, (additional bands were added in 2006 – all below 3.5 MHz, plus 10 GHz). The WIA is not aware of any persistent or repeated negative incidents since band access was increased in the UK.

Denmark has a non-technical entry-level licence category that provides access to five amateur bands above 50 MHz (viz, 6 m, 4 m, 2 m, 70 cm and 23 cm).

The WIA notes that the Malaysian Class B category shown in **Table 2.1** is an exception, with only four permitted bands. However, the WIA notes that the Malaysian regulatory authority (SKMM) has introduced

a Class C entry level licence, with access to the 6 m, 2 m and 70 cm bands; this entry level licence is thus very restricted. The Class A and B licences are retained, with the Class B licence providing access to more bands across HF, VHF and UHF, and powers of 50 W pX; the Class A licence provides access to more bands and use of up to 1 kW in all of the HF bands "except if otherwise indicated".

Table 2.1 Entry level licences – band access in different countries.

■ = access to part or all of the nominated band

Amateur Band	Australia Foundation	Argentina Novicio	Canada Basic	India Restricted	Japan 4th Class	Malaysia Class B	Sth Africa Class B	UK Foundation	USA Technician
2200m					■			■	
600m									
160m				■	■			■	
80m	■	■		■	■		■	■	■
60m				■				■	
40m	■	■			■		■	■	■
30m								■	
20m		■		■				■	
17m		■		■				■	
15m	■	■		■	■			■	■
12m		■		■	■			■	
10m	■	■		■	■	■		■	■
6m		■	■	■	■	■	■	■	■
4m							■	■	
2m	■	■	■	■	■	■	■	■	■
1.25m		■	■						■
70cm	■	■	■	■	■	■	■	■	■
33cm			■						■
23cm		■	■		■		■		■
13cm		■	■		■		■		
9cm		■	■		■				
6cm		■	■		■		■		
3cm		■	■		■		■	■	
12.5mm		■	■		■		■		
6.38mm		■	■		■		■		
4.0mm		■	■		■		■		
2.5mm			■						
2.24mm		■	■		■		■		
1.25mm		■	■		■				

2.3.2 WIA survey - Access to more bands

Other major countries that have a similar entry-level licence provide access to many more bands throughout the spectrum than Australia's Foundation licence, in particular, the UK, Argentina, and Japan.

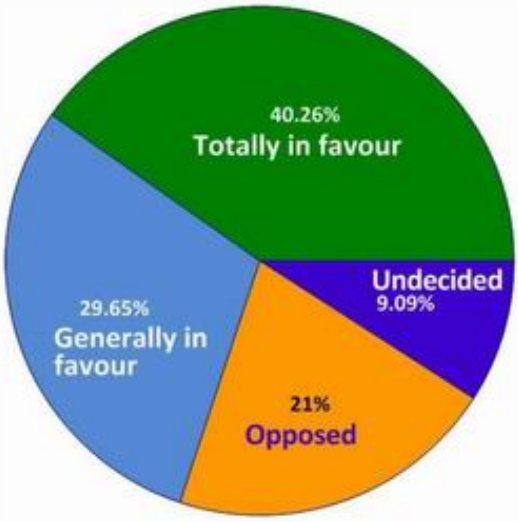
Enabling access to more bands provides a wider range of opportunities for Foundation licensees to learn and gain experience in communications across the radiofrequency spectrum. The one compelling reason not to provide Foundation licensees access to all amateur bands is to maintain an incentive to upgrade.

In other nations having a similar entry-level licence, access to a wide range of bands has apparently not proved a disincentive to upgrade, as other attractive conditions are balanced against band access.

Participants were asked their view, with a choice of four responses.

Foundation Licence – access to more bands

N = 462	Totally in Favour	Generally in Favour	Undecided	Opposed
No.	186	137	42	97
%	**40.3**	**29.7**	**9.1**	**21.0**



Phase 2: Foundation – access to more bands

Over 70% of respondents favoured an increase in permitted bands for Foundation Licensees. Of the ~30% Generally in Favour, views were expressed that allowing more bands was a disincentive to upgrade, or that the bands currently permitted were adequate. The 21% Opposed expressed parallel views, while adding that allowing more bands was providing 'unearned' and unassessed privileges. Respondent numbers signifying Undecided were consistent with prior propositions, except section 2.1.2.

WIA Recommendation:

That the number of permitted bands in **Schedule 3A Column 1** be increased to offer more opportunities for learning and inter-amateur communications and to harmonise better with those of other countries' entry-level licences. In some instances, access to a segment of some bands may be worth consideration.

2.4 Foundation Licence Condition – Transmitter output power as in LCD 2015

Part 6

30 Transmitter output power

The licensee must not operate an amateur foundation station using a transmitter output power of more than 10 watts pX.

2.4.1 Increased power

A decade's experience with the current permitted power of 10 W pX for the Foundation licence demonstrates that it is at a distinct disadvantage in today's urban RF noise environment on the HF and VHF bands, locally and globally.

Foundation station signals often struggle to rise above the prevailing RF noise levels within Australia and as experienced by amateurs in other countries. Competing with urban noise levels is exacerbated in mobile situations, particularly on the bands below 30 MHz.

The WIA notes that the permitted power for entry level licences varies widely around the world:

- 10 W pX (UK - Foundation)
- 50 W pX (Argentina: Inicial. Denmark: Kategori D. Swiss: Konzession 3, VHF-UHF. Mexico - Restringido)
- 100 W pX (South Africa – Class B; Swiss – Konzession 3, HF)
- 50 W dc input (India – Restricted Grade II; assessed equivalent to ~160 W pX)

- 200 W pX (Argentina – Novicio; USA - Technician)

The WIA initially proposed (in 2014) raising the permitted power to 25 W pX. Having considered the conditions prevailing in other countries, along with local circumstances, it is now suggested that 50 W pX would better address this issue for these reasons:

- Amateurs in Australia face the 'tyranny of distance' and are often located in remote or rural locations. The obstacle of distance dominates the ability of Foundation licensees to communicate with other stations, particularly for VHF/UHF and mobile operations, even via repeaters.
- A change to 25 W pX offers an increase in signal-to-noise ratio of just 4 dB, while a change to 50 W pX offers an increase of 7 dB which provides a more practical advantage.
- Many commercial transceivers currently available (HF and VHF-UHF) afford operation at 50 W pX, more so than those that conform to the current permitted power of 10 W.
- Commercial kits for self-assembly of amplifiers rated at 50 W pX are readily available, should Foundation licensees be permitted self-construction (see section 2.5).

There is no extant evidence to suggest that operating at the proposed 50 W pX power level, 7 dB above the current 10 W pX limit, creates any particular safety issue regarding management of electromagnetic emissions (EME).

2.4.2 WIA survey - Increased power

A decade's experience with the 10 W Foundation power limit has demonstrated that it is at a distinct disadvantage in today's urban RF environment and with Australia's geography

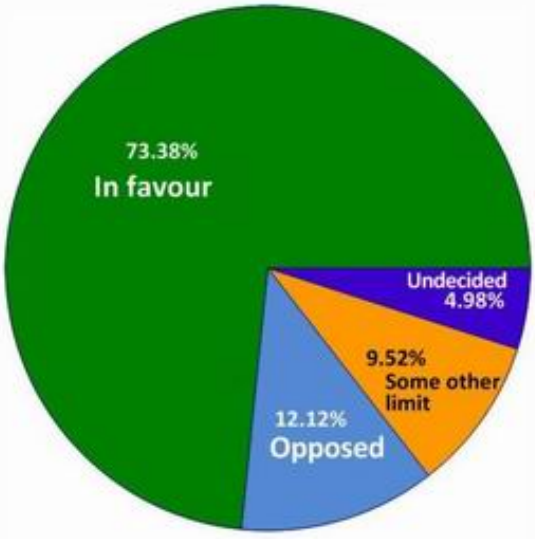
The WIA advocates the power limit be increased to 50 W pX, which does not raise any particular safety issues regarding management of electromagnetic emissions.

Should Foundation licensees gain access to bands above 70 cm, the power limits need to be set at pragmatic levels for safety.

Participants were asked their view, with a choice of four responses.

Foundation Licence – increase power to 50 W pX

N = 462	In Favour	Some other Limit	Undecided	Opposed
No.	339	44	23	56
%	**73.4**	**9.5**	**5.0**	**12.1**



Phase 2: Foundation – power to 50W pX

Over 73% of responders favoured an increase in permitted transmitter output power for Foundation Licensees to 50 W pX. An additional 9.5% of respondents favoured an alternative increase in the permitted power, some suggesting a power below 50 W, while others suggested 100 W. Those Opposed to an increase in power variously cited that more power was 'unsafe' in an entry-level licence with regard to interference, or it provided an 'unearned' and unassessed privilege, or was a disincentive to upgrade (even if other

licence grades gained increased power). Respondents selecting Undecided were generally undecided about other propositions or supported only limited change.

WIA Recommendation:

That **Part 6, Clause 30** be changed to:

The licensee must not operate an amateur foundation station using a transmitter output power of more than 50 watts pX, or more than 30 watts pY.

However, should Foundation licensees be authorised to use bands above 430 MHz, the WIA recommends a reduced power limit on those bands, mindful of the risks of electromagnetic emissions as set out in the Radiocommunications Licence Conditions (Apparatus Licence) Determination 2015.

2.5 Foundation Licence Condition – Commercially manufactured transmitters as in LCD 2015

Part 6

28 Transmitting equipment restrictions

The licensee must not operate an amateur foundation station using a transmitter that has not been manufactured commercially.

2.5.1 Relaxing restriction on use of commercially manufactured transceiver equipment

The WIA seeks relaxation of the restriction on Foundation licensees to use only commercially manufactured transceivers, which includes the microphone.

The objective is to enable Foundation licensees to broaden their range of learning experiences, and for their conditions to more closely match those applicable to like or similar entry-level licences overseas, in particular the UK foundation licence.

The WIA believes this change is also important to encourage self-learning in wireless communication technologies among young people (particularly STEM activities), and to the 'Maker/Hacker' community.

The WIA suggests that Foundation licensees be permitted to:

- assemble and use commercially available receiver, transmitter and transceiver kits. The WIA notes that the UK Foundation licence has permitted this for some years and the WIA notes that there is no evidence of notable incidents or issues reported. The USA's Technician licence has never restricted licensees to commercial equipment
- connect personal computers for the purpose of using digital transmission modes
- use microphones other than the standard microphone provided by the transceiver's manufacturer
- use transceivers commercially manufactured for non-amateur band applications, but adapted for operation on permitted amateur bands and operated within the terms of their licence.

Such conditions have applied to the UK Foundation licence for some years, and to the WIA's knowledge no evidence has emerged of compliance issues requiring regulatory action or management. Likewise with the US Technician licence. Entry-level licences in other nations do not have the restriction to commercial equipment as in Australia's Foundation licence. It would thus seem to be an unnecessary impediment to

licensees' opportunities for learning experiences. Permitting Foundation licensees' self-construction would better reflect the principles embodied in the ITU definition of the Amateur Service.

2.5.2 WIA survey - Relax the restriction to commercial rig use and enable limited DIY

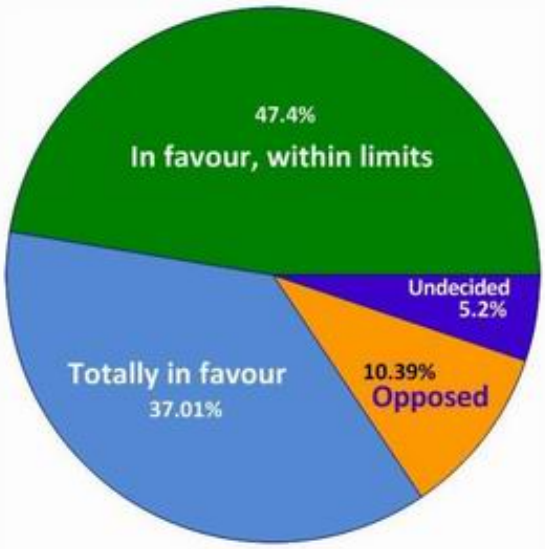
Self-learning and technical experimentation are at the heart of the ITU definition of the Amateur Service.

The WIA advocates relaxing the restriction on Foundation operators to the use of commercially manufactured transceivers.

Participants were asked their view, with a choice of four responses.

Foundation Licence – allow limited DIY

N = 462	Totally in Favour	In Favour Within Limits	Undecided	Opposed
No.	171	219	24	48
%	**37.0**	**47.4**	**5.2**	**10.4**



Phase 2: Foundation – allow limited DIY

Over 84% of responders favoured relaxing the restriction to commercial rig use, and enabling limited DIY for Foundation licensees. While 47% were In Favour Within Limits, a variety of views was expressed about what limits should be imposed. Some cited the likelihood of on-air inter-operator interference and poor quality transmissions, while others advocated some method of supervision or validation of DIY equipment. Those Opposed cited the principle that the Foundation licence was designed as, and should remain, an entry-level licence and that if Foundation operators wanted to build things, they should do the study and upgrade. Those selecting Undecided were generally undecided about other propositions or supported only limited change.

WIA Recommendation:

That **Part 6, Clause 28** be changed to:

The licensee may operate an amateur foundation station using a transmitter that has been:

(i) manufactured commercially

(ii) assembled from an unmodified commercially available receiver and transmitter kit

(iii) a commercially manufactured transceiver intended for non-amateur band applications, but converted for operation on permitted amateur bands and operated within the terms of this licence.

The transmitter in (i), (ii) and (iii) above is permitted to:

(i) be connected to a personal computer for the purpose of using digital transmission modes

(ii) use microphones other than standard microphone provided by the transceiver manufacturer.

The four-character suffix of the Australian Foundation licence callsign format is rare in the world for ordinary station callsigns. Despite a decade's use, along with widespread promotion and education about the callsign format, recognition of Australian Foundation Licence callsigns remains low among the worldwide radio amateur community.

Additionally, a majority of the available range of computer-mediated digital transmission modes cannot accommodate a four-character suffix callsign, which then prevents the use of those digital modes by Australian Foundation licensees. Examples include: Packet / APRS - radio protocol is unable to handle callsigns longer than 6 characters (APRS uses the AX.25 Packet protocol as a transport). Packet has enjoyed worldwide popularity for over 40 years. WSJT (eg, FT8, JT65, JT9, JT4) - protocol uses the minimum bits of entropy to encode callsigns of a set format, which is fixed at 6 characters; presently, FT8 is the most popular mode, worldwide.

If Australian Foundation licensees were permitted the use of digital transmission modes, the present callsign structure would preclude the use of the majority of currently used digital modes.

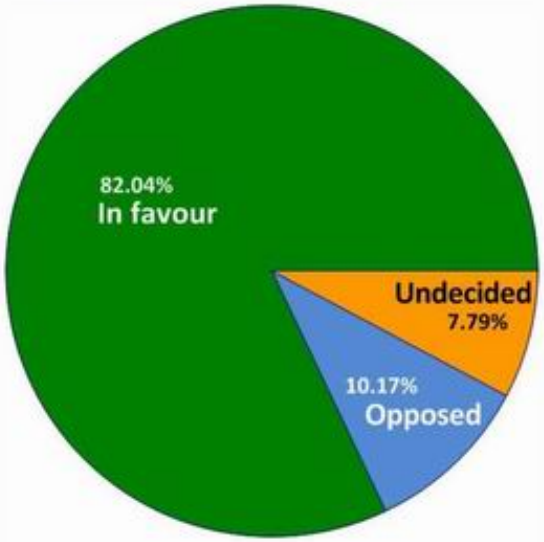
2.6.2 WIA survey - Review of Foundation licence callsigns

A prefix *other than* VK, or the special event prefixes of AX and VI, has been suggested. In the alternative, a three-letter suffix block or blocks with currently little use be identified and adopted.

Foundation Licence – review callsign pattern

N = 462	In Favour	Undecided	Opposed
No.	379	36	47
%	**82.0**	**7.8**	**10.2**

Over 82% of respondents favoured a review of the Foundation Licence callsign structure. Among the 10% Opposed, the view was apparently that licensees' grades must be identifiable by their callsign (as currently applies). Respondents selecting Undecided were generally undecided about other propositions, too.



Phase 2: Foundation – review callsign

WIA Recommendation:

That an alternative callsign pattern be identified for use by Foundation licensees.

WIA Submission – Part 3: Standard Licence Conditions

SUMMARY

- Provide access to more frequency bands
- Relax permitted transmission bandwidths
- Increase maximum permitted power from 100 W to 200 W pX

3.1 Standard Licence Conditions – Frequency Bands as in LCD 2015

Part 5

23 Permitted frequency bands

The licensee must operate an amateur standard station to transmit only on a frequency in a frequency band mentioned in an item in Schedule 3.

Schedule 3 Permitted frequencies and emission modes (amateur standard station)

(sections 23 and 24)

Item	*Column 1* Frequency band	*Column 2* Permitted emission modes
1	3.500 MHz–3.700 MHz 7.000 MHz–7.300 MHz 14.000 MHz–14.350 MHz 21.000 MHz–21.450 MHz	Any emission mode with a necessary bandwidth no greater than 8 kHz
2	28.000 MHz–29.700 MHz 52.000 MHz–54.000 MHz 144.000 MHz–148.000 MHz 430.000 MHz–450.000 MHz 1 240.000 MHz–1 300.000 MHz 2 400.000 MHz–2 450.000 MHz 5.650 GHz–5.850 GHz	Any emission mode with a necessary bandwidth no greater than 16 kHz

3.1.1 Access to more bands

The Standard licence was instituted to accommodate the former Novice licence at the time Amateur licensing was reformed in 2004. In the 3-tier licence regimen adopted following licensing reform, the Standard licence is thus an intermediate grade, a concomitant purpose being to provide an upgrade path between Foundation and Advanced, with the 'incentive' of better licence conditions.

The number of permitted bands for the Australian Standard licence is quite restricted when compared with the intermediate level licence designations in other countries, as evidenced from **Table 3.1**. The WIA suggests increasing the number of permitted bands for Standard licensees between 1.8 MHz and 28 MHz and, particularly, access to 50-52 MHz.

- The Australian Standard licence's progenitor in the UK has considerably more band access across the spectrum; the WIA is not aware of any evidence regarding notable complaints or issues.
- Likewise, Argentina, Canada, Japan, the UK and the USA also provide wide access to bands across the spectrum; again, the WIA is not aware of any evidence regarding notable complaints or issues.

As noted regarding the Foundation licence, having more bands provides a wider range of opportunities for licensees to learn and gain experience across the radiofrequency spectrum.

The 3-tier Australian amateur licence system had its genesis in the UK amateur licensing system; it was adapted to accommodate the previous five-tier Australian licence system. However, the conditions for the Australian Standard licence largely reflect the previous Novice licence, with three microwave bands added to differentiate it from the Foundation licence.

Hence, in comparison to other countries' Intermediate licences:

- the Australian Standard licence has 10 frequency bands
- the UK Intermediate licence has 25 equivalent bands (4 m / 70 MHz is not available in Australia)
- Argentina's Intermedia has 21 equivalent bands
- Canada's Basic+ has 25 equivalent bands
- the USA's General has 24 equivalent bands
- Japan's 3rd Class has 20 equivalent bands

Australian Standard licence holders have far fewer bands in which to experiment and learn.

The WIA believes that, from the experiences of other countries, there is little evidence that providing access to more bands would act as a disincentive to Standard licensees upgrading to the Advanced licence.

Table 3.1 Intermediate level licences – band access in different countries.

■ = access to part or all of the nominated band

Amateur Band	Australia Standard	Argentina Intermedia	Canada Basic +	Japan 3rd Class	UK Intermediate	USA General
2200m			■	■	■	
600m						
160m			■	■	■	■
80m	■	■	■	■	■	■
80m DX			■	■		■
60m			■		■	■
40m	■	■	■	■	■	■
30m			■		■	■
20m	■	■	■		■	■
17m		■	■		■	■
15m	■	■	■	■	■	■
12m		■	■	■	■	■
10m	■	■	■	■	■	■
6m		■	■	■	■	■
4m					■	
2m	■	■	■	■	■	■
1.25m		■	■			■
70cm	■	■	■	■	■	■
33cm			■			■
23cm	■	■	■	■	■	■
13cm	■	■	■	■	■	■
9cm		■	■	■	■	■
6cm	■	■	■	■	■	■
3cm		■	■	■	■	■
12.5mm		■	■	■	■	■
6.38mm		■	■	■	■	■
4.0mm		■	■	■	■	■
2.5mm			■		■	■
2.24mm		■	■	■	■	■
1.25mm		■	■	■	■	■

3.1.2 WIA survey - Access to more bands

The number of permitted bands for the Australian Standard licence is quite restricted in comparison with the intermediate level licences in other countries.

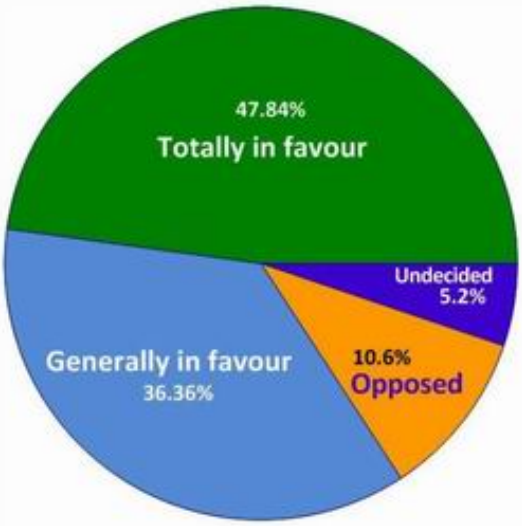
The WIA advocates increasing the number of permitted bands for Standard licensees between 1.8 MHz and 28 MHz and, particularly, enabling access to 50-52 MHz. This would provide greater opportunities for learning experiences and inter-amateur communications.

Having more bands provides a wider range of opportunities for licensees to learn and gain experience across the radiofrequency spectrum and adds incentives for Foundation licensees to upgrade.

Standard – access to more bands

N = 462	Totally in Favour	Generally in Favour	Undecided	Opposed
No.	221	168	24	49
%	**47.8**	**36.4**	**5.2**	**10.6**

An overwhelming 84% of respondents were in Favour of an increase in permitted bands for Standard Licensees. Of the 36% Generally in Favour, views were expressed that additional bands should be limited so that an incentive to upgrade was maintained. Among those Opposed, the view was expressed that new privileges beyond what previous Novice licensees had should be 'earned'.



Phase 2: Standard – access to more bands

WIA Recommendation:

That the number of amateur bands for Standard licensees be increased to provide greater opportunities for learning experiences and inter-amateur communications and to harmonise better with those of other countries' intermediate level licences, while balancing incentives to upgrade.

3.2 Standard Licence Conditions – Permitted bandwidth as in LCD 2015

Part 5

24 Emissions from an amateur standard station

The licensee must not operate an amateur standard station in a frequency band mentioned in column 1 of an item in Schedule 3 unless:

(a) the station is operated using an emission mode mentioned in column 2 of the item; and

(b) the transmission remains entirely within that frequency band mentioned in the item.

3.2.1 Relaxation of permitted bandwidths

The WIA seeks a relaxation of the permitted bandwidths relating to the Standard licence, where practicable, on identified bands below 1 GHz, and on all bands above 1 GHz, to allow the use of wideband transmission modes. Wider permitted bandwidth would enable Standard licensees to experiment with recently developed, and yet to be developed, wide-band transmission technologies.

3.2.2 WIA survey - Relaxation of permitted bandwidths

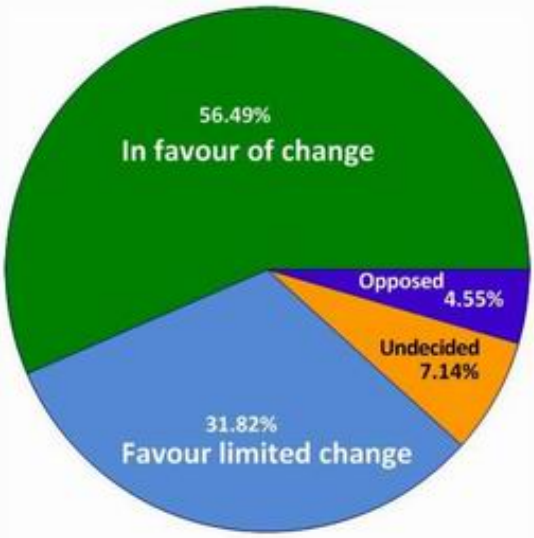
Prescribing permitted bandwidths related to transmission modes locks-in past technologies and locks-out the ability to explore use of technologies emerging in the future.

Respondents were offered four response categories:

Standard – increase permitted bandwidths

N = 462	In Favour of Change	Favour Limited Change	Undecided	Opposed
No.	261	147	33	21
%	**56.5**	**31.8**	**7.1**	**4.5**

With over 87% of respondents In Favour, the demand for an increase in permitted bandwidths for Standard Licensees is well established. Of the ~32% who Favour Limited Change, the general view concerned maintaining the incentive to upgrade. Maintaining the status quo was a concern among those Opposed.



Phase 2: Standard – relax bandwidths

WIA Recommendation:

1. The WIA seeks relaxation of the permitted bandwidths relating to the Standard licence, where practicable, on identified bands below 1 GHz, and on all bands above 1 GHz, to allow the use of wideband digital and image transmission modes.
2. That **Schedule 1 Emission Modes** be reduced to a practicable minimum to avoid prescribing emission modes in every detail.
3. That **Part 5, Clause 24** be modified to be:

Emissions from an amateur standard station

The licensee must not operate an amateur standard station in a frequency band mentioned in column 1 of an item in Schedule 3A unless the transmission remains entirely within that frequency band, except where transmission bandwidth is otherwise specified.

3.3 Standard Licence Conditions –Transmitter power as in LCD 2015

Part 5

25 Transmitter output power

(1) The licensee must not operate an amateur standard station, using a transmitter output power of more than 100 watts pX, if the emission mode of the station includes:

(a) J3E; or

(b) R3E

(2) The licensee must not operate an amateur standard station, with an emission mode not mentioned in subsection (1), using a transmitter output power of more than 30 watts pY.

3.3.1 Increased power

The WIA notes that the permitted power of 100 W pX for Standard licensees was a carryover from the former Novice licence. The WIA suggests that a permitted power of 200 W pX would be a sensible pragmatic provision for the Standard licence, for these reasons:

- The suggested increased permitted power affords Standard licensees the opportunity to explore and experiment with RF technologies (in commercially-made and home constructed equipment) and on-air operations in the context of an increasing urban RF noise environment on the HF and VHF bands, now being experienced within Australia and across the world.
- Many commercial transceivers currently available, and others produced over the last decade and generally available on the second-hand market, provide output power at the suggested level.

There is a wide disparity between countries in permitted powers for intermediate level licences (as the various regulatory authorities assign them; they are not necessarily equivalent to the Australian Standard licence). The range of this disparity is illustrated in **Table 3.3.**

There is no extant evidence to suggest that operating at the proposed 200 W pX power level, 3 dB above the present 100 W pX limit, creates any additional safety issues regarding the management of electromagnetic emissions (EME).

Additionally, the WIA has conducted an education campaign to raise awareness in the Australian radio amateur community of licensees' responsibility in EME compliance. To encourage and educate members and the radio amateur community:

- material has been published in the WIA journal *Amateur Radio* and on the WIA's website
- presentations have been delivered:
  - to affiliated radio clubs
  - at amateur radio events (including Australia's largest annual field day)
  - at the annual WIA Conference and AGM.

Table 3.3 **Permitted power levels for intermediate level licences in different countries**

COUNTRY	MAX. PERMITTED POWER (W)	pX / pY	Licence class
Argentina	500	pY	Intermedia
Austria	200	pX	Class B
Canada	560 / 190	pX / pY	Basic+
Chile	1200	pX	General & Novicio
Denmark	100	pY	Category B
France	120	pX	Classe 2
Indonesia	<30 MHz: 150 >30 MHz: 75	pX	General
Israel	250	pX	General
Italy	50	pX	Classe B
Japan	200	pX, pY	2nd Class Operator
Malaysia	50	pX	(new proposal)
Mexico	500	pX, pY	Clase II Aficionado
Peru	250	pY	Intermedia
Portugal	750	pX	Class B (½ Class A pwr)
South Africa	100 (20 dBW)	pX	Class B
UK	50 (17 dBW)	pX	Intermediate
USA	1500	pX	General

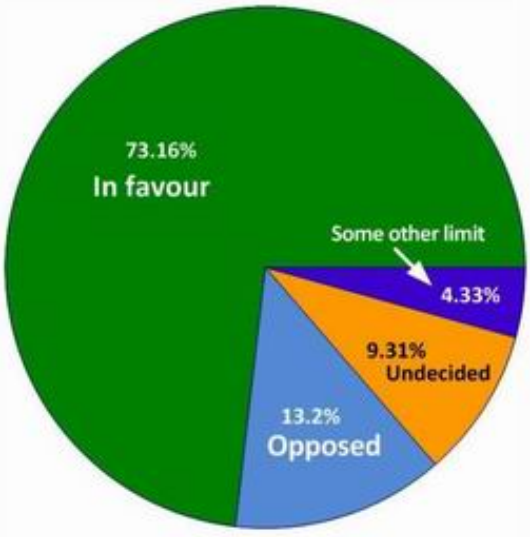
3.3.2 WIA survey - Increased power

Respondents were offered four response categories:

Standard – power increase to 200 W pX

N = 462	In Favour	Some Other Limit	Undecided	Opposed
No.	338	20	43	61
%	**73.2**	**4.3**	**9.3**	**13.2**

An overwhelming 73% of respondents were In Favour of an increase in permitted transmitter power output for Standard Licensees to 200 W pX. An additional 4.3% of respondents supported Some Other Limit (ranging up to the 400 W limit for Advanced licensees). Those Opposed sought to maintain the status quo and / or expressed the view that going beyond what previous Novice licensees had should be 'earned'.



Phase 2: Standard – power to 200W pX

WIA Recommendation:

That **Part 5, Clause 25** be modified to:

Transmitter output power

The licensee must not operate an amateur standard station using a transmitter output power of more than 200 watts pX, or more than 60 watts pY.

WIA Submission – Part 4: Advanced Licence Conditions

SUMMARY

- Continuing access to current amateur allocations
- Priority for access to the 5.3 MHz band allocated at WRC-15
- Provide access to some new frequency bands
- Extend the limits of current amateur allocations at 1.8 MHz and 3.5 MHz
- Relax permitted transmission bandwidths
- Increase maximum permitted power to 1500 watts pX, with conditions

4.1 Advanced Licence Condition – Frequency Bands as in LCD 2015

Part 3

13 Permitted frequency bands

The licensee must only operate an amateur advanced station on a frequency that:

(a) is within in a frequency band mentioned in column 1 of an item in the table in Part 1 of Schedule 2;

(b) if a transmission made using the station would occur in an area specified in column 1 of an item in the table in Part 2 of Schedule 2 – is not within the frequency range specified in column 2 of the item.

Schedule 2 Permitted frequencies and emission modes (amateur advanced station)

(sections 13 and 14)

Part 1 Permitted frequencies and emission modes

Item	*Column 1* **Frequency band**	*Column 2* **Permitted emission modes**
1A	135.7 kHz–137.8 kHz [see note 5] 472 kHz–479 kHz [see note 6]	Any emission mode with a necessary bandwidth no greater than 2.1 kHz
1	1.800 MHz–1.875 MHz 3.500 MHz–3.700 MHz 3.776 MHz–3.800 MHz 7.000 MHz–7.300 MHz 10.100 MHz–10.150 MHz 14.000 MHz–14.350 MHz 18.068 MHz–18.168 MHz 21.000 MHz–21.450 MHz 24.890 MHz–24.990 MHz	Any emission mode with a necessary bandwidth no greater than 8 kHz

	2	28.000 MHz–29.700 MHz	Any emission mode with a necessary bandwidth no greater than 16 kHz
	3	50.000 MHz–54.000 MHz 144.000 MHz–148.000 MHz	Any emission mode with a necessary bandwidth no greater than 100 kHz
	4	430.000 MHz–450.000 MHz 1 240.000 MHz–1 300.000 MHz 2 300.000 MHz–2 302.000 MHz 2 400.000 MHz–2 450.000 MHz 3.300 GHz–3.425 GHz [see note 2] 3.425 GHz–3.4425 GHz [see note 3] 3.4425 GHz–3.475 GHz [see note 4] 3.475 GHz–3.4925 GHz [see note 3] 3.4925 GHz–3.5425 GHz [see note 2] 3.5425 GHz–3.575 GHz [see note 4] 3.575 GHz–3.600 GHz 5.650 GHz–5.850 GHz 10.000 GHz–10.500 GHz 24.000 GHz–24.250 GHz 47.000 GHz–47.200 GHz 76.000 GHz–81.000 GHz 122.250 GHz–123.000 GHz 134.000 GHz–141.000 GHz 241.000 GHz–250.000 GHz	Any emission mode
[plus **Part 2 Excluded frequency ranges**]			

4.1.1 Frequency bands – continuing access, extending two bands and proposed new bands

As already foreshadowed in the covering letter, these matters are to be addressed during the ACMA's consultation when reviewing and updating the *Australian Radiofrequency Spectrum Plan*.

Radio amateurs are very privileged to have access to many frequency allocations across the UHF and microwave spectrum, some of which are currently the subject of review, and which the WIA accepts are likely to be partly reassigned to new telecommunications and entertainment services, in particular at 3.6 GHz.

The WIA's view is that having a greater number of narrow frequency assignments to the amateur service would be of value, especially if they were harmonised as much as possible to amateur assignments in other countries. This would allow greater opportunities for experimentation and intercommunication by radio amateurs using the full range of available technologies, extant and emerging. It would also enable radio amateurs to experience a greater range of radio propagation characteristics across the spectrum.

An issue that has arisen following the WIA's licence conditions consultation, likely brought to the fore because of it, concerns extending the 3.5 MHz band to 'fill-in' between 3700 kHz and 3776 kHz. This would provide a contiguous amateur service allocation of 3500-3800 kHz, thus matching, in whole or in part, the amateur allocations in many other countries across the world. This proposal is also in keeping with the proposed extension of the 3.5 MHz band above 3800 kHz, for the same reason.

4.1.2 WIA survey - Improved frequency band access

Having frequency band allocations across the radiofrequency spectrum affords amateur operators maximum opportunities to explore, experiment, and learn about technologies and techniques in radiocommunications – the principles central to the ITU definition of the Amateur Service.

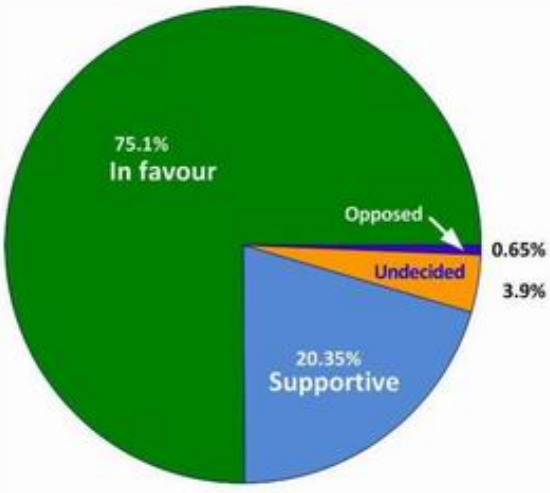
The WIA advocates earliest-possible release of the **new band at 5351.5-5366.5 kHz**, allocated by the ITU at the World Radio Conference 2015 and incorporated in the Australian Radiofrequency Spectrum Plan (ARSP) that commenced on 1 January 2017. This allocation has been keenly awaited by Australian radio amateurs and the WIA believes that it would be advantageous to enable access, **in part or in whole**, ahead of completing the new Licence Conditions Determination. The WIA notes that trial operations on the band have commenced in New Zealand, following arrangements made between the New Zealand Amateur Radio Transmitters (NZART), Radio Spectrum Management (RSM) and the NZ Defence Force. To mitigate possible interference issues to Primary users that may arise, even with the low station power levels involved, the WIA is willing to involve all stakeholders in developing awareness and implementation strategies to enable access.

In addition, in responding to the ACMA's update of the ARSP, the WIA proposed:

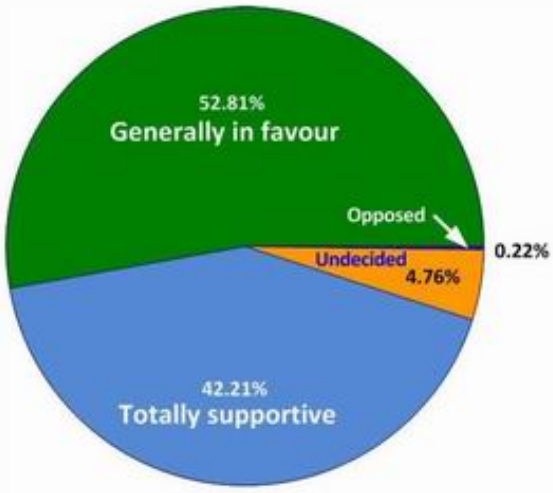
- primary status for Amateurs on 50-52 MHz
- a proposed secondary allocation at 70.0-70.5 MHz
- a proposed secondary allocation within the 918-926 MHz ISM band
- extension of the 1800-1875 kHz band up to 2000 kHz
- extension of the 3776-3800 kHz DX Window above 3800 kHz.

Respondents were asked their opinion concerning:

	1/ Access to new bands				2/ Advocacy for continued access to existing primary and secondary bands			
N = 462	In favour	Supportive	Opposed	Undecided	Totally Supportive	Generally in favour	Opposed	Undecided
No.	347	94	3	18	195	244	1	22
%	**75.1**	**20.3**	**0.7**	**3.9**	**42.2**	**52.8**	**0.2**	**4.8**



Phase 2: Advanced – access to new bands



Phase 2: Advanced – advocate retaining bands

There was overwhelming support both for retaining existing bands, and increasing the number of bands for Advanced licensees, an unsurprising result. Those few Opposed also opposed other proposed changes to licence conditions. The small percentage of respondents indicating Undecided, were also generally undecided about or opposed proposed changes to other licence conditions across all three licence grades; some expressed concern about the implications of change.

WIA Recommendations:	
(a) That priority be given to enabling Advanced licensees to use the **5351.5-5366.5 kHz band**, already listed in the Australian Radiofrequency Spectrum Plan that commenced on 1 January 2017. (b) Establishing that the following amateur allocations, with the exception of 50-52 MHz, be available to Advanced licensees only.	
1875 – 2000 kHz	To harmonise the Australian amateur allocation with that of many other countries across ITU Regions 1, 2 and 3. See section 4.1.3 and Table 4.1.3a.
3700 – 3776 kHz	To harmonise the Australian amateur allocation with those in many other countries across ITU Regions 1, 2 and 3. See section 4.1.3 and Table 4.1.3b.
3800 – 4000 kHz	
50 – 52 MHz	Primary status for amateurs (Advanced and Standard) on 50-52 MHz. See section 4.1.4.
70 – 70.5 MHz	Early release of an allocation in this band, as per the WIA submissions to the ACMA of 11 July 2014 and to RALI LM2 of 30 July 2016. See Table 4.1.5.
918 – 926 MHz	To enable the amateur service to experiment and intercommunicate with equipment based on devices widely available for the 900 MHz LIPD Class Licence segment. See section 4.1.6.

4.1.3 Harmonisation of the 160 metre and 80 metre amateur bands

The WIA is of the view that the proposed changes to the Australian allocations of these two bands need to be considered in the context of global allocations and, in particular, the amateur allocations of neighbouring countries in the Asia-Pacific region. Indonesia, Malaysia, the Philippines, Thailand and New Zealand all have contiguous amateur allocations for the 160 m and 80 m bands that are much broader than the Australian amateur allocations, as is readily seen in **Tables 4.1.3a** and **4.1.3b**, respectively.

In terms of propagation, these two bands become important over solar minimum years, when maximum usable frequencies of ionospheric propagation fall into the lower HF spectrum and the effects of D-region absorption decreases. The 160 m and 80 m amateur bands are used both for local and international communications, as propagation conditions allow.

The propagation characteristics of the 160 m band enable reliable short-range (local) communications during daytime hours and medium and long-range communications during night-time hours. Amateurs use the 80 m band extensively for reliable contacts over distances of up to 500+ km during the day, and for distances up to 10,000 km and more at night, as ionospheric conditions and the RF noise environment allow. In many countries, the 80 m band is heavily populated by networks of amateur stations providing

training for emergency communications during disasters, and is heavily used during communications emergencies.

Table 4.1.3a 160 metre amateur band allocations across the world

Argentina	1800–2000
Australia	1800–1875
Brazil	1800–1850
Canada	1800–2000
Europe (CEPT)	1810–1850
India	1820–1860
Indonesia	1800–2000
Israel	1810–2000
Japan	1810–1825, 1907.5–1912.5
South Korea	1800–1825
Malaysia	1800–2000
Mexico	1800–2000
New Zealand	1800–1950
Peru	1800–2000
Philippines	1800–2000
Portugal	1810–1850
Russia	1810–2000
Thailand	1800–2000
South Africa	1810–1850
United States	1800–2000

The International Amateur Radio Union (IARU) has determined that, in the vicinity of 1800 kHz, the amateur service requires an exclusive worldwide allocation of 100 kHz and an additional shared worldwide allocation of 100 kHz. The Australian allocation, at 75 kHz, falls well short of the IARU's identified requirements. **Table 4.1.3a** demonstrates the shortcomings of the Australian allocation compared against those across the world, and particularly in the Asia-Pacific.

On 48 weeks of the year, there are contests – 'radio sport' – that encourage and promote the use of the 160 m band. Every month, there is a significant global contest, widely promoted and attracting popular support. On occasion, 'crowding' on the 1800-1875 kHz band is evident. This is exacerbated when stations operate from rare locations (DXpeditions).

In Australia, the spectrum segment 1875 kHz to 2000 kHz is largely vacant of identified licensed users.

The WIA understands that, in the Australasian region, the former LORAN navigation systems have long since cleared the band, and that only one geophysical radar system and the defence services retain an interest in 1875-2000 kHz. The WIA believes there is scope to extend the current 1800-1875 kHz allocation at the earliest opportunity (even incrementally), which would benefit Australian amateur community use of the 160 m band.

Table 4.1.3b 80 metre amateur band allocations across the world

Argentina	3500–4000
Australia	3500–3700, 3776-3800
Brazil	3500–3800
Canada	3500–4000
Europe (CEPT)	3500–3800
India	3500–3700, 3890-3900
Indonesia	3500–3900
Israel	3500–3800
Japan	3500–3575 3599-3612 3680-3687 3702-3716 3745-3770 3791-3805
South Korea	3500-3550, 3790-3800
Malaysia	3500–3900
Mexico	3500–4000
New Zealand	3500–3900
Peru	3500–4000
Philippines	3500–3900
Portugal	3500–3800
Russia	3500–3800
Thailand	3500–3900
South Africa	3500–3800
United States	3500–4000

In relation to the 80 m band, the IARU has determined that the amateur service requires a common, worldwide exclusive allocation of at least 300 kHz, and retention of the present additional shared allocations in Regions 2 and 3. The Australian allocation falls short of the IARU's identified requirements, as demonstrated in **Table 4.1.3b**.

Contest and DXpedition activity is more prevalent on the 80 m band than experienced on 160 m. In particular, crowding in the 3776-3800 kHz DX window is frequently reported. It is observed that many overseas amateurs expect to contact Australian stations outside the confines of 3776-3800 kHz.

The WIA is aware of the complexities facing expansion of the 80 m band as proposed. Extending the band from 3700 kHz to the lower edge of the 'DX window' at 3776 kHz presents difficulties because of the number of extant assignments there, particularly to government and community services. There is a similar issue with the proposed extension between 3800 kHz and 4000 kHz. The WIA believes that, as existing incumbents migrate to other communications facilities over time, then amateur use of available small spectrum segments could be allocated incrementally, perhaps on a secondary basis to start with. This could be achieved through embargoes on new assignments and re-farming existing assignments, where possible. Prior examples exist with the so-called WARC-79 bands at 10, 18 and 24 MHz and allocation of the 3776-3800 kHz DX Window.

4.1.4 Primary Status for 50-52 MHz

The last Channel 0 station (45-52 MHz) closed on 27 November 2013. On 13 December 2013, the ACMA advised the WIA (file reference ACMA2012/1199) that 'amateur operations in the 50-52 MHz band will no longer need to be curtailed in order to avoid interference to channel 0 stations.'

Since that time, the WIA is aware of only one other application proposed for the band. The proposal was by the Australian National University for an experimental broadband system known as BushLAN in the 45-54 MHz frequency band. A sharing study by the WIA demonstrated that the proposed system was incompatible with amateur use of the 50-54 MHz band. The WIA suggested that the recently vacated 56-70 MHz frequency band would be more appropriate for the ANU's proposed application.

The WIA notes that Broadcasting remains the Primary service in the 50-52 MHz band and that Defence no longer has an interest in the 50-54 MHz allocation.

However, the WIA has become aware recently that there may be future interest from free-to-air broadcasters in the 45-52 MHz band for deploying new digital technology transmissions. In the meantime, industry sources postulate that audience and industry interest in free-to-air television is eroding under competition from internet streaming, dominated by the US entertainment behemoths Amazon and Netflix. While internet entertainment streaming is generally delivered by broadband to the home at present, industry sources report that 5G telecommunication services are set to compete heavily when they become established over the next few years.

It is the WIA's view that orphaned free-to-air TV broadcast spectrum cannot provide a competitive consumer platform, even if newly developed broadcast technologies mature sufficiently while the NBN and 5G rollouts continue apace. Hence, 50-52 MHz may be strongly considered for allocation to the Amateur Service on a Primary basis. However, the WIA recognises that the Radio Regulations footnote 5.168 will have to be altered if radio amateurs are to get Primary status for the amateur service in 50-52 MHz and that change is being resisted by other stakeholders.

The WIA notes that WRC-19 agenda item 1.1 (WRC Res 658) concerns allocation of the 50-54 MHz frequency band to the Amateur Service in ITU Region 1. This is of particular interest to the Australian radio amateur community, given the prior experience with global propagation opportunities, and that such an allocation in Region 1 would afford greater opportunities to experience and explore intercontinental propagation on this band.

4.1.5 Proposed allocation within 70.0 – 70.5 MHz

The WIA first signalled to the ACMA the amateur radio community's interest in obtaining an allocation at 70 MHz in July 2014, in an invited submission to Ms Ann Chadwick, Policy Analyst, Industry Partnerships Section, concerning the then-foreshadowed remake of the Radiocommunications Licence Conditions (Amateur Licence) Determination No. 1 of 1997. The proposal was reiterated in the WIA's submission of April 2016 on 'Future Amateur Licence Conditions', addressed to Mr David Brumfield, Executive Manager, ACMA Communications Infrastructure Division, Spectrum Management Policy. The proposition was also advocated in submissions to the ACMA in July 2016 (re: *Proposed updates to RALI LM 2 and MS 42 IFC: 17/2016*) and January 2018 (re: *Five-year spectrum outlook 2017–21: the ACMA's spectrum management work program*).

To reiterate (from the prior submissions): the WIA is seeking access to a band within 70.0-70.5 MHz under Article No. 4.4 of the ITU Radio Regulations, initially. The WIA understands that No. 4.4 provides that operations do not cause harmful interference to the Primary radio services, and that the possibility of harmful interference from such services is accepted. In summary, the WIA seeks an Amateur Service allocation as a secondary service within 70.0-70.5 MHz (perhaps a segment within that 0.5 MHz) that is preferably congruent with, or overlapping, allocations in other countries, particularly in Region 1 (see **Table 4.1.5a**).

Table 4.1.5a International 70 MHz amateur allocations as at 13 July 2017

Country	Licence	Power – watts	Notes
Andorra		10	
Bahrain	General	500	
Belgium	CEPT	50	
Bulgaria	CEPT	50	
Croatia		10	
Czech Republic			
Denmark	CEPT	25	
Eire	General	50 pX	Mobile operation limited to 25 W pX
Estonia	CEPT	1000	Class A licence 1000 W; Class B (& CEPT) 100 W; Class D 10 W
Faeroe Islands	General	100	
Finland	CEPT	25, 30, 100	Power restricted near borders; only 25 W permitted 70.25 – 70.3 MHz
France			Allocation under consideration
Germany	Class A	25	
Greece	CEPT	100 pX	Maximum bandwidth 3 kHz
Greenland	CEPT	1000	
Hong Kong			Beacon on 71.575 MHz
Hungary		10 (erp)	
Iceland			
Italy			
Kazakhstan	Individual	100	
Latvia	CEPT	100	Antenna directions restricted
Lithuania	CEPT	22 (eirp)	Max. bandwidth 3 kHz for SSB, 500 Hz for CW; some geographic restrictions
Luxemburg		10 (erp)	
Macedonia	Individual	10	Allocation under consideration
Malta	CEPT		
Monaco	CEPT	25	
Montenegro	CEPT	100, 25	A and N licence grades
Namibia		400	
Netherlands	CEPT	50 pX	All licence classes
Norway	CEPT	100	Including arctic islands; some geographic restrictions
Poland	CEPT	20 (eirp)	
Portugal	CEPT	100 (eirp)	Incl. Azores & Madeira. Class 1 licence only
Romania	Individual	20	
San Marino			
Slovakia	Individual	10 (erp)	
Slovenia		100	
Somalia		3000	
South Africa		400 pX	
Spain	CEPT	10	
Sweden	CEPT		
United Kingdom	CEPT	160	70.0-70.5 MHz. Channel Islands, Northern Island and Wales to 71.5 MHz
United Arab Emirates	General	100	
USA	Special		Beacon on 70.005 MHz WG2XPN

11 countries have allocated 70-70.5 MHz; 6 countries have allocated 70-70.3 MHz; 5 countries have allocations starting within 69.90-70.00 MHz; Others have allocated segments <500 kHz, or several small segments. Source: www.70mhz.org/index.php

The WIA notes that 69.9 MHz – 70.5 MHz (known as the 4 m band) is listed as a secondary amateur allocation in the 'European Table of Frequency Allocations and Applications' (page 65), a CEPT publication (ITU Region 1), published in October 2017 (www.erodocdb.dk/docs/doc98/official/pdf/ERCRep025.pdf).

As the 4 m band has been allocated to the Amateur Service across CEPT countries for two decades or more, the International Amateur Radio Union (IARU) has developed a bandplan – **Table 4.1.5b**.

Table 4.1.5b IARU Region 1 Bandplan for 70 MHz (4 m)

MHz	70.000 to 70.090	70.100	70.250	70.294	70.500
Tx Bandwidth	1 kHz	1 kHz	2.7 kHz	12 kHz	12 kHz
Mode	Telegraphy, digital	Beacons	Telegraphy, SSB, digital	AM, FM	FM: 12 kHz channels
Usage	Coordinated beacons	Temporary and Personal beacons	70.185 Cross-band calling 70.200 CW / SSB calling 70.250 MS calling	70.260 AM/FM calling 70.270 digital activity ctr	70.3125 digital 70.3250 digital 70.450 FM calling 70.4875 digital

As the band sits between 50 MHz and 144 MHz, it provides propagation characteristics redolent of each, yet unique to itself (based on reports over many years in amateur and technical journals, and on websites).

Technologically and topologically, equipment embodies techniques similar to each of the amateur bands above and below, representing somewhat of a 'transition' between the two.

4.1.6 Amateur Allocation at 918 – 926 MHz

This band enables the amateur service to experiment and intercommunicate with equipment based on solid-state devices widely available, and with more emerging, for the 900 MHz LIPD Class Licence segment, and operating within the LIPD power limitations.

The WIA sees potential for the proposed allocation to serve as a focus for STEM educational activities.

Experimentation with new radio technologies, such as LoRa (long range, wide area) and other mesh network technologies would be greatly aided if radio amateurs were encouraged to experiment with the range of new low-cost technologies available for Class-Licenced LIPD bands.

The WIA is of the view that radio amateurs may currently communicate on Class-Licensed LIPD bands under the 'all transmitters' category, subject to the 'all transmitters' technical conditions.

However, the WIA wishes to explore the additional possibility of:

- the Amateur Service being specifically authorised to use any frequency designated as 'all transmitters' in the LIPD Class Licence or any equivalent future spectrum authorisation. This would avoid potential confusion and conflict when amateurs use their call signs on LIPD bands.
- inter-communications between the Amateur Service and LIPD devices on LIPD Class-licensed frequencies.

4.2 Advanced Licence Condition – Permitted Bandwidth as in LCD 2015

Part 3

14 Emissions from an amateur advanced station

The licensee must not operate an amateur advanced station on a frequency in a frequency band mentioned in column 1 of an item in the table in Part 1 of Schedule 2 unless:

(a) the station is operated using an emission mode mentioned in column 2 of the item; and

(b) the transmission remains entirely within that frequency band.

Schedule 2 Permitted frequencies and emission modes (amateur advanced station)

(sections 13 and 14)

Part 1 Permitted frequencies and emission modes

Item	*Column 1* **Frequency band**	*Column 2* **Permitted emission modes**
1A	135.7 kHz–137.8 kHz [see note 5] 472 kHz–479 kHz [see note 6]	Any emission mode with a necessary bandwidth no greater than 2.1 kHz
1	1.800 MHz–1.875 MHz 3.500 MHz–3.700 MHz 3.776 MHz–3.800 MHz 7.000 MHz–7.300 MHz 10.100 MHz–10.150 MHz 14.000 MHz–14.350 MHz 18.068 MHz–18.168 MHz 21.000 MHz–21.450 MHz 24.890 MHz–24.990 MHz	Any emission mode with a necessary bandwidth no greater than 8 kHz
2	28.000 MHz–29.700 MHz	Any emission mode with a necessary bandwidth no greater than 16 kHz
3	50.000 MHz–54.000 MHz 144.000 MHz–148.000 MHz	Any emission mode with a necessary bandwidth no greater than 100 kHz

(Higher frequency bands removed for the purpose of this item)

4.2.1 Relaxation of permitted bandwidths

The WIA seeks relaxation of permitted bandwidths for Advanced licensees on all the amateur bands from 1.8 MHz to 430 MHz, with the aim of enabling the exploration and use of emerging and newly developed technologies, because:

- future developments in technologies and applications are undefined
- the parallel development of software defined radio and sophisticated signal processing software over the past decade has enjoyed significant uptake across the amateur radio community globally.

While these developments have been built on exploiting extant narrowband transmission modes within permitted bandwidths, foreseeable development in the mid-term will likely involve low spectral density transmissions of wider bandwidth, or dynamically variable bandwidths, able to co-exist with other transmissions in overlapping spectrum spaces while providing robust information exchange.

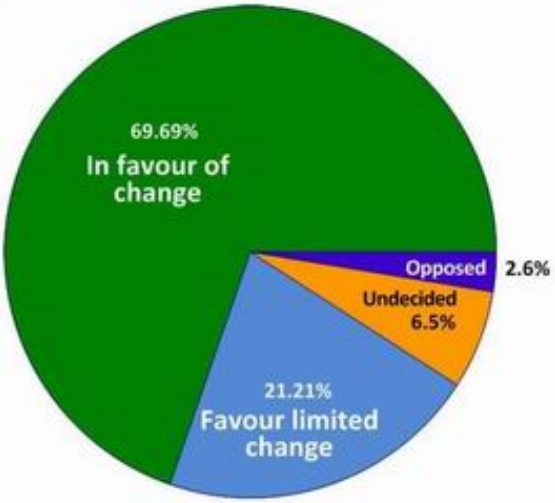
NB: The current permitted emission mode bandwidth of 2.1 kHz for 135.7 kHz–137.8 kHz would be retained as the band is only 2.1 kHz wide. The WIA recommends an emission bandwidth of 3 kHz on the 472 kHz–479 kHz band to allow the use of standard SSB telephony or other transmission modes that require a bandwidth of 3 kHz.

4.2.2 WIA survey - Relaxation of permitted bandwidths

Respondents were offered four response categories:

Relaxation of permitted bandwidths

N = 462	In Favour of Change	Favour Limited Change	Opposed	Undecided
No.	322	98	12	30
%	**69.7**	**21.2**	**2.6**	**6.5**



Phase 2: Advanced – relax bandwidths

More than 90% of respondents favoured relaxation of permitted bandwidths, only 21.2% being in favour of Limited Change in permitted bandwidths for Advanced Licensees. Of those who favoured limited change, many also sought limited change across other conditions and licence grades. Those respondents who selected Undecided were often also undecided about relaxing bandwidths for the other licence grades. Among those Opposed to relaxing permitted bandwidths, many were often also opposed to change with the other licence grades.

WIA Recommendation:

That **Schedule 1 Emission Modes** be reduced to a practicable minimum to avoid prescribing emission modes in every detail.

That the permitted bandwidth restriction be relaxed to enable Advanced licensees to use wide bandwidth, low-spectral density transmissions on all amateur bands from 1.8 MHz to 30 MHz, and wide bandwidth transmissions on the 50-52 MHz and 144-148 MHz bands not limited by spectral density.

That the WIA and the ACMA develop an appropriate limit for maximum permitted spectral power density.

4.3 Advanced Licence Condition – Transmitter output power as in LCD 2015

Part 3

16 Transmitter output power

(1) Without limitation to sections 15 and 15C, the licensee must not operate an amateur advanced station, using a transmitter output power of more than 400 watts pX, if the emission mode of the station includes:

(a) C3F; or

(b) J3E; or

(c) R3E.

(2) Without limitation to sections 15 and 15C, the licensee must not operate an amateur advanced station, with an emission mode not mentioned in subsection (1), using a transmitter output power of more than 120 watts pY.

4.3.1 Increase in maximum permitted power

It is unfortunate that the regimen for regulating electromagnetic emissions (EME) in Australia has conflated the compliance accountability with regulatory responsibility for the radiocommunications sector. In this, Australia is unique in the world.

Since the end of the High Power Trial in 2013, the WIA has conducted an education campaign to raise awareness in the Australian radio amateur community of licensees' responsibility in EME compliance. Material has been published in the WIA's journal *Amateur Radio* magazine and on the WIA's website, and presentations have been delivered to affiliated radio clubs to encourage and educate their members.

It is fair to say that awareness of EME compliance is now much greater as a result of these initiatives. In addition, awareness of EME compliance is now incorporated in the AOCP examination syllabuses.

However, compliance with the Apparatus LCD (remade in 2015) is 'invisible' within the Amateur LCD (also remade in 2015), and is only brought to amateurs' attention on their licence documents. The WIA wishes to see EME compliance clearly highlighted in future Amateur Licence conditions.

Further, the WIA is mindful that, as the Apparatus LCD 2015 is in force, the nexus between EME compliance and radiocommunications regulation remains and the ACMA is accountable for ensuring compliance. Given this, the WIA is committed to working with the ACMA to develop a protocol to enable those Advanced licensees who wish to experiment with transmitter powers above 400 W pX and up to 1500 W pX to provide suitable documentary evidence demonstrating that they have addressed compliance with the Apparatus LCD 2015.

To reduce the regulatory workload on the ACMA, it is proposed that the WIA conduct an application and validation process on behalf of the ACMA and then make a recommendation to the ACMA. The approval for high power would then become part of the Advanced licensee's licence conditions.

As noted with other licence grades, the maximum permitted powers around the world vary widely, as Table 4.3.1 demonstrates. The 34 countries in the table would represent the majority of the world's amateurs licensed at the top grade. Almost 30% of those countries permit a maximum power of 1500 W pX, or more. Some 41% permit 1000 W pX. The median maximum permitted power in this list is 1250 W pX.

Table 4.3.1. Maximum permitted power by country, ranked by power

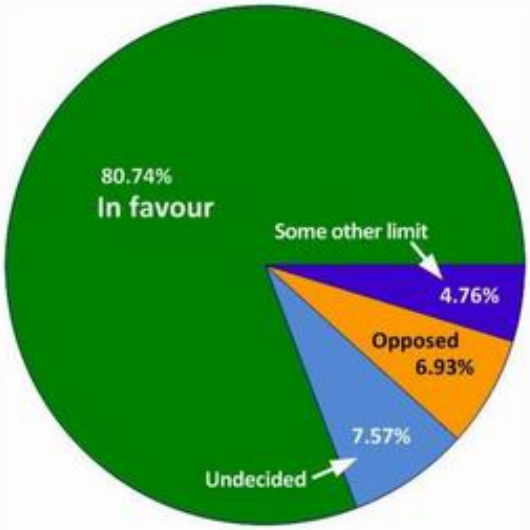
Country	Max. permitted power (W)	pX / pY	Notes
Somalia	3000	pX, pY	
Canada	2250	pX	CITEL
Chile	2000	pX	CITEL
	1200		Mobile station, Superior grade; Fixed station, Superior grade
Argentina	1500	pY	CITEL
Chinese Taipei	1500	pX, pY	
Hungary	1500	pX, pY	For CW, AM, FM, SSB, digital CEPT
Israel	1500	pX, pY	
Portugal	1500	pX	CEPT
South Sudan	1500	pX, pY	
USA	1500	pX	CITEL
Mexico	1250	pX, pY	CITEL
Austria	1000	(pX, pY)	CEPT
Belgium	1000	pX	CEPT
Brazil	1000	pX	
Denmark	1000	pY	CEPT
Indonesia	1000	pX	
Japan	1000	pX, pY	
Malaysia	1000	pX	New limit proposed
New Zealand	1000	pY	Seeking 1500 W
Norway	1000	pY	CEPT
Peru	1000	pY	CITEL
Spain	1000	pX, pY	CEPT
Sweden	1000	pX	CEPT (From PTSFS 2014:5)
Switzerland	1000	pY	CEPT
Thailand	1000	pX	
Germany	750	pX	CEPT
France	500	pX	CEPT
Greece	500	pX, pY	CEPT
Italy	500	pX	CEPT
Ireland	400	pX, pY	
India	400	pX, pY	DC input to final stage
Malaysia	400	pX	Past limit; new conditions to come
South Africa	400	pX	
UK	400	pX	CEPT

4.3.2 WIA survey - Increased power

It is understood that the current maximum permitted power of 400 W pX / 120 W pY is generally accepted by many operators. However, several operators seek the opportunity to explore and experiment with the use of higher powers, for a variety of applications, which is likely to continue in the future.

The WIA advocates raising the maximum permitted power to 1500 W pX, provided that operators submit documentary evidence demonstrating that they have addressed compliance with the Apparatus LCD 2015.

Respondents were offered four response categories:



Phase 2: Advanced – increased power

Increased power

N = 462	In favour of change	Opposed	Undecided	Some other limit
No.	373	32	35	22
%	**80.7**	**6.9**	**7.6**	**4.8**

Unsurprisingly, over 85% of respondents were in favour of an increase in permitted maximum power for Advanced Licensees under the conditions proposed. Some 4.8% of respondents were in favour of an alternative power limit, particularly specifying 1500 watts. Of those Opposed, many were also opposed to increased power for the other licence grades.

WIA Recommendation:

That the WIA work with the ACMA to develop a protocol to enable those Advanced licensees who wish to experiment with transmitter powers above 400 W pX and up to 1500 W pX to provide suitable documentary evidence demonstrating that they have addressed compliance with the Apparatus LCD 2015.

That the WIA conducts an application and validation process on behalf of the ACMA from which to make a recommendation to the ACMA of a licensee's suitability for a high-power authorisation.

That the WIA and the ACMA develop an appropriate limit for maximum permitted spectral power density for wideband transmissions.

WIA Submission – Part 5: Remaining licence issues

SUMMARY

- Clarifying definitions
- Use of internet-connected repeater systems by Foundation licensees
- Radiation Safety
- Callsigns

5.1 Clarifying definitions

Several issues have arisen over time where the regulation does not give clear guidance to licensed radio amateurs. Many of these issues have arisen as a result of regulatory development not keeping pace with new technologies available to the amateur service.

For instance, some digital mode transmissions do not lend themselves to current station identification requirements. The current requirements for the operation of repeaters do not consider repeaters that are internet-linked to other repeaters nationally or internationally.

In addition, the WIA seeks clear rules regarding the remote operation of amateur stations that are not amateur repeater stations. This includes: an amateur station located in a remote (non-urban) region, operated and controlled by the licensee who is not present at the station location, or the operation of an amateur home station by the licensee who is not present.

It would be of assistance the amateur service to have these issues clarified within the regulations, thus reducing the burden of regulatory intervention and interpretation issue-by-issue as they arise.

5.1.1 WIA Survey– Clarifying definitions and intent of some current provisions

The WIA seeks clarification of these provisions in the Amateur LCD 2015:

- Clause 7 – interference
- Clause 8 (1) – brief transmissions, station identification requirements
- Clause 8 (6) – retransmission
- Clause 9 (1) – operation of repeaters

There is a level of uncertainty and confusion within the amateur radio community concerning these particular provisions. They need to be clarified and resolved for future licence conditions.

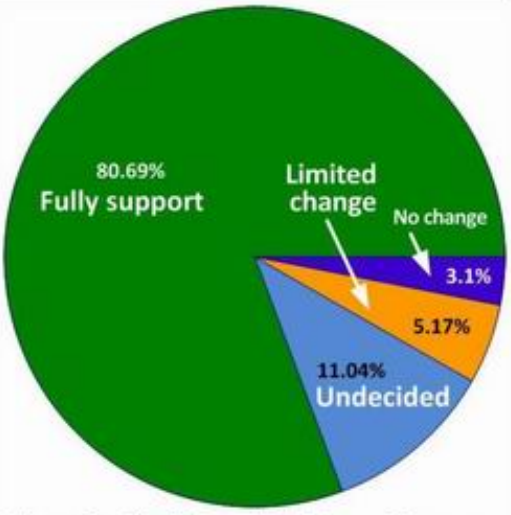
In particular, in Clause 9 (1), the examples relating to (c) and (d) refer to older or legacy technology, and would be better if re-worded to include more recent and emerging technologies.

Respondents were asked their view on this issue, with a choice of four responses:

Clarifying definitions and intent

N = 290	Fully Support	Favour Limited Change	Undecided	No Change
No.	234	15	32	9
%	**80.7**	**5.2**	**11.0**	**3.1**

Over 85% of respondents support clarification of the definitions and intent of the affected clauses.



Phase 3: Clarifying definitions & intent of some current provisions

WIA Recommendation:

That the WIA and the ACMA work to clarify the intent of the affected provisions.

5.2 Use of internet-connected repeater systems by Foundation licensees

Internet-connected repeaters are proliferating through the amateur service in Australia and internationally. There are issues where a Foundation licensee can connect through an internet-linked repeater but has no control over the power, or bands where this transmission may be rebroadcast. The rebroadcast may be outside the licence conditions of the Foundation licensee.

The WIA believes that the Amateur LCD 2015 does not adequately cover the issue of internet-connected repeaters.

5.2.1 WIA Survey– Clarifying definitions and intent of some current provisions

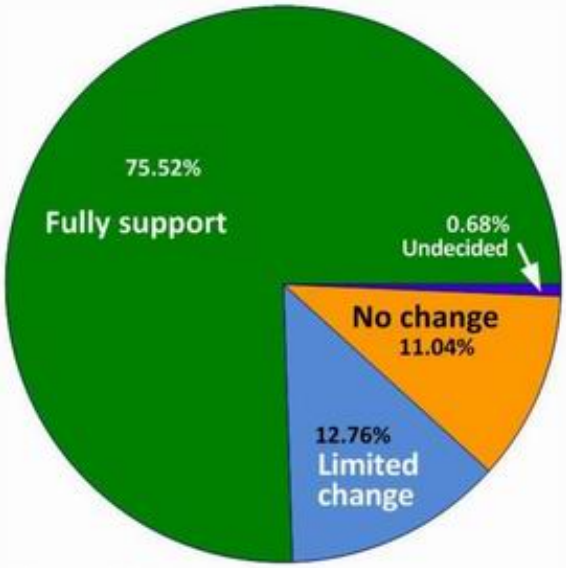
The WIA seeks clear provisions to be incorporated in future Amateur licence conditions.

Respondents were asked their view on this issue, with a choice of four responses.

Review of net-connected repeater use by Foundation licensees

N = 290	Fully Support	Favour Limited Change	Undecided	No Change
No.	219	37	2	32
%	**75.5**	**12.8**	**0.7**	**11.0**

Over 88% of respondents support clear provisions to be incorporated in future Amateur licence conditions, in keeping with the general principle of ensuring licensees' ability to explore and experiment with the



Phase 3: Review net-connected repeater use by Foundation licensees

least impediment, balanced with responsible use of the spectrum and respect for other stakeholders.

WIA Recommendation:

That the WIA and the ACMA work to ensure clear provisions are incorporated in future Amateur licence conditions, particularly in relation to internet-connected repeaters.

5.3 Radiation safety

Radiation safety is a very important issue for radio amateurs.

Since the end of the High Power Trial in 2013, the WIA has conducted an education campaign to raise awareness in the Australian radio amateur community of licensees' responsibility in Electromagnetic Emissions (EME) compliance. To encourage and educate Australian radio amateurs, material has been published in the WIA's journal *Amateur Radio,* on the WIA's website, and delivered in presentations at WIA AGM and Conference weekend events, to affiliated radio clubs, as well as at the Central Coast Amateur Radio Club's annual Field Day, the biggest gathering of radio amateurs from around Australia.

Hence, it is now fair to say that awareness of EME compliance requirements is much greater as a result of these initiatives. In addition, awareness of EME compliance is now incorporated in the AOCP assessments.

However, compliance with the Apparatus LCD (remade in 2015) is "invisible" within the Amateur LCD (also remade in 2015), and is only brought to licensees' attention on their licence documents. The WIA wishes to see EME compliance clearly highlighted in future Amateur Licence conditions.

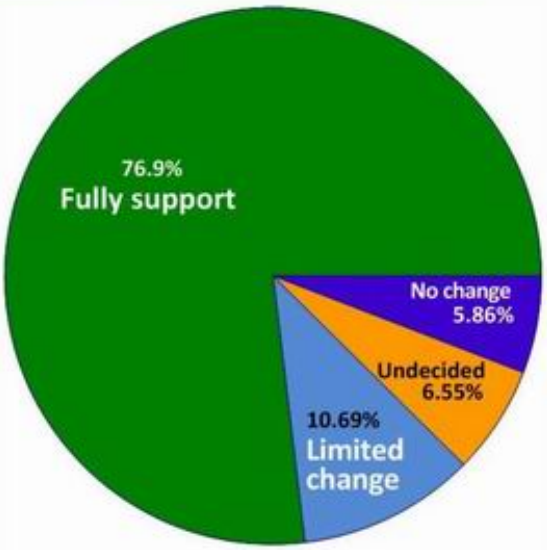
5.3.1 WIA Survey - Clear visibility of licensees' Electromagnetic Emissions compliance responsibility

The connection with the related determination (Apparatus LCD 2015) on the important issue of EME should be incorporated in future Amateur licence conditions, clearly setting out a licensee's accountability for meeting EME compliance requirements. In addition, a review of the existing published guidelines would aid licensees' meeting compliance.

Respondents were asked their view on this issue, with a choice of four responses:

Clear visibility of licensees' EME compliance responsibility

N = 290	Fully Support	Favour Limited Change	Undecided	No Change
No.	223	31	19	17
%	**76.9**	**10.7**	**6.6**	**5.9**



Phase 3: Clear visibility of licensees' EME compliance responsibility

Over 87% of respondents support the inclusion of conditions on Electromagnetic Emissions (EME) in future Amateur licence conditions, including compliance requirements.

WIA Recommendation:

That EME compliance be clearly highlighted in future Amateur Licence Conditions.

5.4 Callsigns

The amateur service is one of the last radiocommunications services to use callsigns; however, they are extremely important to the operation of the amateur service and licensees value them very highly.

Callsign prefixes identify the country and the State only. The class of licence held is identified in the following three or four letters.

There are issues with the use of a 4-letter identifier for the Foundation grade not being widely recognised as discussed in Part 2 of this submission.

Special-purpose callsigns are allocated to licensees to commemorate a special event, but the term "special event" is not well defined and some special event callsigns have been allocated to events that would probably not be considered "special" enough.

The WIA administers amateur radio callsigns in Australia on behalf of the ACMA and seeks a review of the callsign arrangements to determine if they remain fit for purpose.

5.4.1 WIA survey - Callsigns – prefix and suffix patterns, and special callsigns

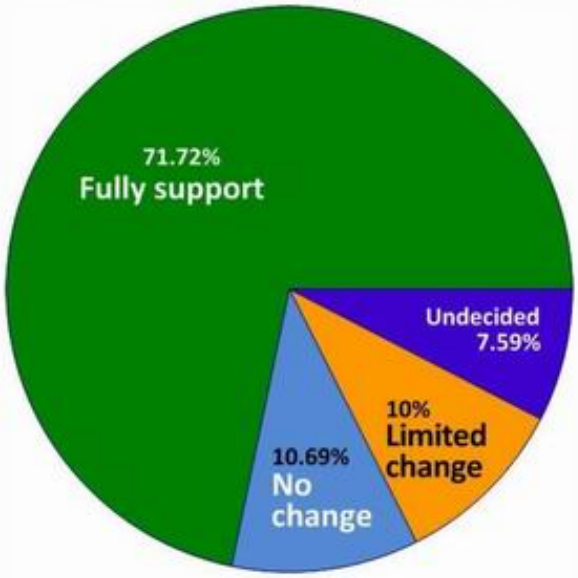
The WIA seeks a review of the patterns of use of prefixes and suffixes to determine if they remain fit for purpose. The review is to include:

- custom-and-practice to date concerning special event and special callsigns that are generally obtained and used for defined or limited-period occasions
- Foundation licence callsigns, highlighted in Part 2 of this submission.

Respondents were asked their view on this issue, with a choice of four responses:

Review of callsigns

N = 290	Fully Support	Favour Limited Change	Undecided	No Change
No.	208	29	22	31
%	**71.7**	**10.0**	**7.6**	**10.7**



Phase 3: Review callsigns – prefix and suffix patterns; special callsigns

Over 81% of respondents support a review of the patterns of use of prefixes and suffixes to determine if they remain fit for purpose.

WIA Recommendation:

That the WIA and the ACMA review patterns of use of amateur callsign prefixes and suffixes to determine if they remain fit for purpose.

President, VK2VU, Gary
Vice President, VK3CM, Brenton
Secretary, VK2FKLR, Kathleen
Treasurer, Amy

NEVARC CLUB PROFILE

History

The North East Victoria Amateur Radio Club (NEVARC) formed in 2014.
As of the 7th August 2014, Incorporated, Registered Incorporation number A0061589C.
NEVARC is an affiliated club of the Wireless Institute of Australia.

Meetings

Meetings details are on the club website, check for latest scheduled details.
Meetings held at the Belviour Guides Hall, Silva Drive West Wodonga.

VK3ANE NETS

HF
7.095 MHz Monday, Wednesday, Friday - 10am Local time
3.622 MHz Wednesday - 8.30pm Local time

VHF
VK3RWO Repeater 146.975 MHz – Monday - 8pm Local time
All nets are hosted by Ron Hanel VK3MRH (soon to be VK3ARH) using the club callsign VK3ANE

Benefits

To provide the opportunity for Amateur Radio Operators and Short Wave Listeners to enhance their hobby through interaction with other Amateur Radio Operators and Short Wave Listeners. Free technology and related presentations, sponsored construction activities, discounted (and sometimes free) equipment, network of likeminded radio and electronics enthusiasts. Excellent club facilities and environment, ample car parking.

Website: www.nevarc.net.au

Postal: **NEVARC Secretary**
PO Box 69
Wahgunyah Vic 3683

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This is particularly true for pre-planned outdoor activities affected by adverse weather etc.
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